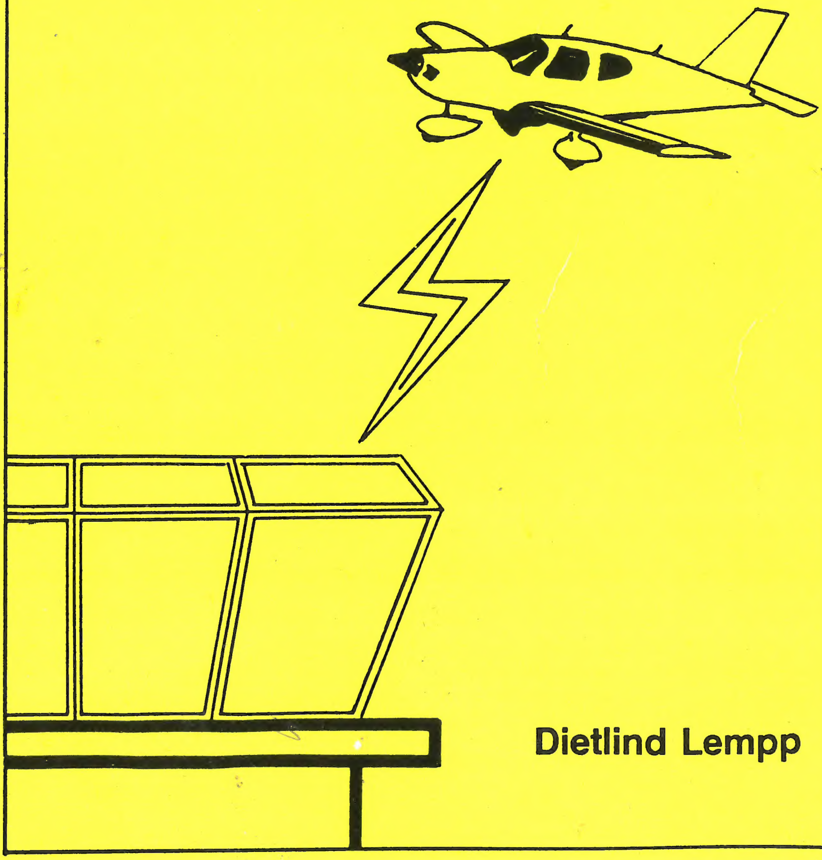
The Pilot's Radio Handbook

Third Edition



Dietlind Lempp

The Pilot's Radio Handbook

by Dietlind Lempp

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PREFACE

"Radio" is a subject that many pilots approach with caution if not outright distaste. Some experienced pilots, especially those flying mainly in the country areas are dangerously unfamiliar with controlled airspace and often either refuse to enter such airspace or, if they do, perceive the air traffic controller as the "enemy" who is there to make their lives difficult. The truth is far from this: in fact, it is often the "radio-inexperienced" pilot who makes the controller's life difficult.

I have written this book with the aim of making pilots understand what "radio" is all about and to take the mystery out of the procedures associated with it. I sincerely hope that with it I am helping both the novice and the experienced pilot to understand the air traffic control system better and therefore make flying more enjoyable.

The International Civil Aviation Organization (ICAO) is the governing body for Air Traffic Procedures. Member states of ICAO adhere to the internationally laid down procedures, but may declare differences to ICAO material in specific areas. These differences have to be registered with ICAO and published in the AIP. ICAO also lays down how pilots should communicate with controllers, but concerns itself mainly with aircraft flying from point A to point B, preferably in a straight line on an IFR Flight Plan. Often, the procedures prove inadequate for training flights in small aircraft, for banner-towing operations, photographic flights, traffic helicopters etc. Although it is desirable that all controllers and pilots adhere to ICAO-recommended phraseology, this is not always practical and usually a 'local phraseology' has evolved for those operations. Some of this 'adapted' phraseology has been incorporated in this book. If in doubt, pilots are urged to visit their local ATC Centre. Controllers are usually very helpful in resolving any conflict and in enlightening pilots about local procedures, special routings, reporting points etc.

Several changes have been incorporated in this third edition. South Africa has adopted the ICAO airspace classification into classes A to G, which is explained in chapter 1. Chapter 7.10 now includes the interception signals, which, by law, have to be carried on every cross-country flight. New radio procedures for uncontrolled airspace (Traffic Information Broadcast Aircraft - TIBA) are dealt with in chapter 8 and the appendices. Chapter 13 'IFR Procedures' has been considerably enlarged.

I wish to take this opportunity to thank all my students who have, with their questions, shown me where the difficulties in understanding "radio" lie. I also thank the ATC staff at Cape Town, especially Messrs Doug Abbott, Johan le Grange, Greg Manzoni, Robert Sinclair, and Dennis Williams for the invaluable help they have given me. Mr. Peter Pegrume has helped me tremendously with the technical chapter. Last, but by no means least, I wish to thank my husband, Gray van Eck, for proof reading, for suggestions, and for entertaining our two sons while I was busy writing. Without him, this book would never have been written.

DL - Cape Town, October 1992

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INTRODUCTION

To obtain a Private Pilot's Licence (PPL) the candidate must have in his possession the "Restricted Certificate of Competency in Radiotelephony (Aeronautical)" issued by the Postmaster General. The General Licence "General Certificate of Competency in Radiotelephony (Aeronautical)" becomes necessary if the candidate either wants to fly aircraft with a Maximum All-up Weight in excess of 2720 kg, plans to obtain an Instrument Rating or wishes to become a Commercial or higher rated pilot.

Candidates for both licences have to undergo an examination in four parts:
- written examination
- completing a flight plan form
- deciphering morse code as used for the identification of navigational beacons
- oral examination in the form of "talking through" a simulated flight.

Whereas the emphasis for the Restricted Licence lies on a good general knowledge of the rules and procedures governing visual flying, candidates for the General Licence have to demonstrate additional knowledge with regard to flights according to Instrument Flight Rules (IFR). The examination for the Restricted Licence may be taken with any Approved Examiner (usually senior flying instructors), whose names can be readily obtained at the nearest flight school. Examinations for the General Licence are taken at any Air Traffic Control Centre in South Africa. The examination fee for either exam is ~~R 22.~~ 25

Candidates undergoing the examinations should bring with them:
- a R ~~22~~ 25 receipt issued at any post office (not a postal order)
- two recent passport size photographs
- their ID book
- enough knowledge to pass the exam.

The syllabus for both the Restricted as well as the General Radio Licence is laid out in AIC 30.9 issued by the Directorate for Civil Aviation (DCA). Both syllabi are covered in this textbook, with the additional knowledge required for the General Licence clearly marked in the text. A thorough knowledge of the material covered in this textbook is sufficient to pass the respective examinations. For candidates who nevertheless want to go deeper into the matter references are given as to the source of the information in each chapter. The references refer to the following publications:

- AIP - Aeronautical Information Publication
  the basic aeronautical information document for South Africa, contains information of a lasting character essential to air navigation. The AIP is obtainable from the DCA for R 156 plus an annual charge of R 60 for the quarterly amendment service. Alternatively, an AIP is kept at ATC centres and at flying schools and clubs.

- NOT - NOTAMs - Notice to Airmen
  contain information of a non-permanent nature pertinent to navigation or safety of aircraft as well as information which will at a later stage be included in the AIP. NOTAMs class I are transmitted telegraphically to all Air Traffic Service Units (ATSUs); ~~NOTAMs class II are sent free of charge to any licensed pilot on a monthly basis.~~ NOTAMS class II superceded by AIP SUP (AIP Supplement Service), issued monthly (AIC 10.1/15.11 92)

- AIC - Aeronautical Information Circulars
  contain requirements and information regarding technical and administrative matters of civil flying, which do not qualify for inclusion into AIP or NOTAMs. AICs are sent free of charge to any licensed pilot on a monthly basis.

- ROA - Rules of the Air, Air Traffic Services, Search and Rescue and Overflight Regulations, 1975 obtainable as part of the "Aviation Legislation in South Africa" from Butterworths Professional Publishers (Pty) Ltd, P.O.Box 792, Durban 4000 at R 108.90. Alternatively, this publication may be consulted at ATC centres and flying clubs and schools.

- DOC - ICAO Document 4444
  and other relevant ICAO documentation is kept at ATC centres.

Best success with your studies and safe flying

Dietlind Lempp

N.B. Please note that all information in this book might be subject to change, especially frequencies, transition altitudes and the like. Therefore this book should not be used for flight planning purposes without additional reference to the valid and up-to-date official publications.

ABBREVIATIONS

A/c	Aircraft
Abm	Abeam
ACC	Area Control Centre
ADA	Advisory Area
ADF	Automatic Direction Finding
ADR	Advisory Route
AFIS	Aerodrome Flight Information Service
AGL	Above Ground Level
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
ALERFA	Alert Phase
ALT	Altitude
AMSL	Above Mean Sea Level
Apch	Approach
APP	Approach Control
ATA	Aerodrome Traffic Area
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
ATS	Air Traffic Services
ATSU	Air Traffic Services Unit
ATZ	Aerodrome Traffic Zone
Avbl	Available
AWY	Airway
COM	Communications
CTA	Control Area
CTL	Control
CTR	Control Zone
DCA	Directorate of Civil Aviation
DETRESFA	Distress Phase
DF	Direction Finding
DME	Distance Measuring Equipment
EAT	Expected Approach Time
ELBA	Emergency Locator Beacon Aircraft
ELEV	Elevation
ELT	Emergency Locator Transmitter
ETA	Estimated Time of Arrival
FAD	Danger Area South Africa
FAP	Prohibited Area South Africa
FAR	Restricted Area South Africa
FIC	Flight Information Centre
FIR	Flight Information Region
FIS	Flight Information Service
FL	Flight Level

ABBREVIATIONS (continued)

FPL	Filed Flight Plan
GCA	Ground Controlled Approach
GFA	General Flying Area
GMT	Greenwich Mean Time (outdated, see UTC)
GND	Ground
GNS	Global Navigation System
GPS	Global Positioning System
HF	High Frequency
hPa	Hectopascal (previously millibar)
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
INCERFA	Uncertainty Phase
INFO	Information
INS	Inertial Navigation System
kHz	Kilohertz
kt	Knots
LF	Low frequency
mb	Millibar (outdated, now hPa)
MET	Meteorological or meteorology
METAR	Meteorological Aerodrome Report
MF	Medium Frequency
MHz	Megahertz
MIL	Military
MSL	Mean Sea Level
NAV	Navigation
NDB	Non-Directional Beacon
nm	Nautical Miles
NOTAM	Notice to Airmen
OCA	Obstacle Clearance Altitude
OCH	Obstacle Clearance Height
OCT	Onward Clearance Time
PAR	Precision Approach Radar
PPL	Private Pilot's Licence
QBI	IFR is compulsory
QDM	Magnetic heading (zero wind)
QDR	Magnetic bearing
QFE	Atmospheric pressure at aerodrome elevation
QNE	Indicated height on landing with altimeter subscale set to 1013.2 hPa
QNH	Altimeter subscale setting to obtain elevation when on the ground
QTE	True bearing
R/T	Radio Telephony
RT/F	Radio Telephony
RMK	Remark
RNAV	Area Navigation

ABBREVIATIONS (continued)

RVR	Runway Visual Range
RWY	Runway
SAR	Search and Rescue
SAST	South African Standard Time
SELCAL	Selective Calling System
SID	Standard Instrument Departure
SMC	Surface Movement Control
SSR	Secondary Surveillance Radar
STAR	Standard Terminal Arrival Route
SVFR	Special Visual Flight Rules
TIBA	Traffic Information Broadcast Aircraft
TMA	Terminal Control Area
TWR	Aerodrome Control Tower, Aerodrome Control
TWY	Taxiway
UHF	Ultra High Frequency
UNL	Unlimited
UTA	Upper Control Area
UTC	Universal Coordinated Time
VDF	Very High Frequency Direction Finding
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omni Range (Navigational Beacon)

1. AIRSPACES

(Ref: ICAO Annex 11 - AIP RAC 3 - AIP RAC 5 - AIP RAC 6 - AIC 21.15 - ROA 3.30 - ROA 3.31 - ROA 3.32 - ROA 6.1 - ROA 6.2 - ROA 7.1 - ROA 7.2)

Air Traffic Service is provided by Air Traffic Service Units (ATSUs). The whole of the Republic of South Africa is divided into five Flight Information Regions (FIRs) and one Upper Flight Information Region (UIR), in which Air Traffic Service is provided by the five Flight Information Centres (FICs). The code-letters for South Africa are set by the International Civil Aviation Organisation (ICAO) to be FA, therefore the names of the FIRs and FICs are prefixed with FA. The five centres are then named after the towns in which the Flight Information Centres are situated: Cape Town, Port Elizabeth, Durban, Bloemfontein and Johannesburg. All these towns again have a two-letter abbreviation, so that the FIRs are as follows:

FACT	Cape Town FIR and FIC
FAPE	Port Elizabeth FIR and FIC
FADN	Durban FIR and FIC
FABL	Bloemfontein FIR and FIC
FAJS	Johannesburg FIR and FIC

Namibia is now independant and comprises one FIR, ~~but is still using the prefix FA:~~

FYWH
~~FAWH~~ Windhoek FIR and FIC.

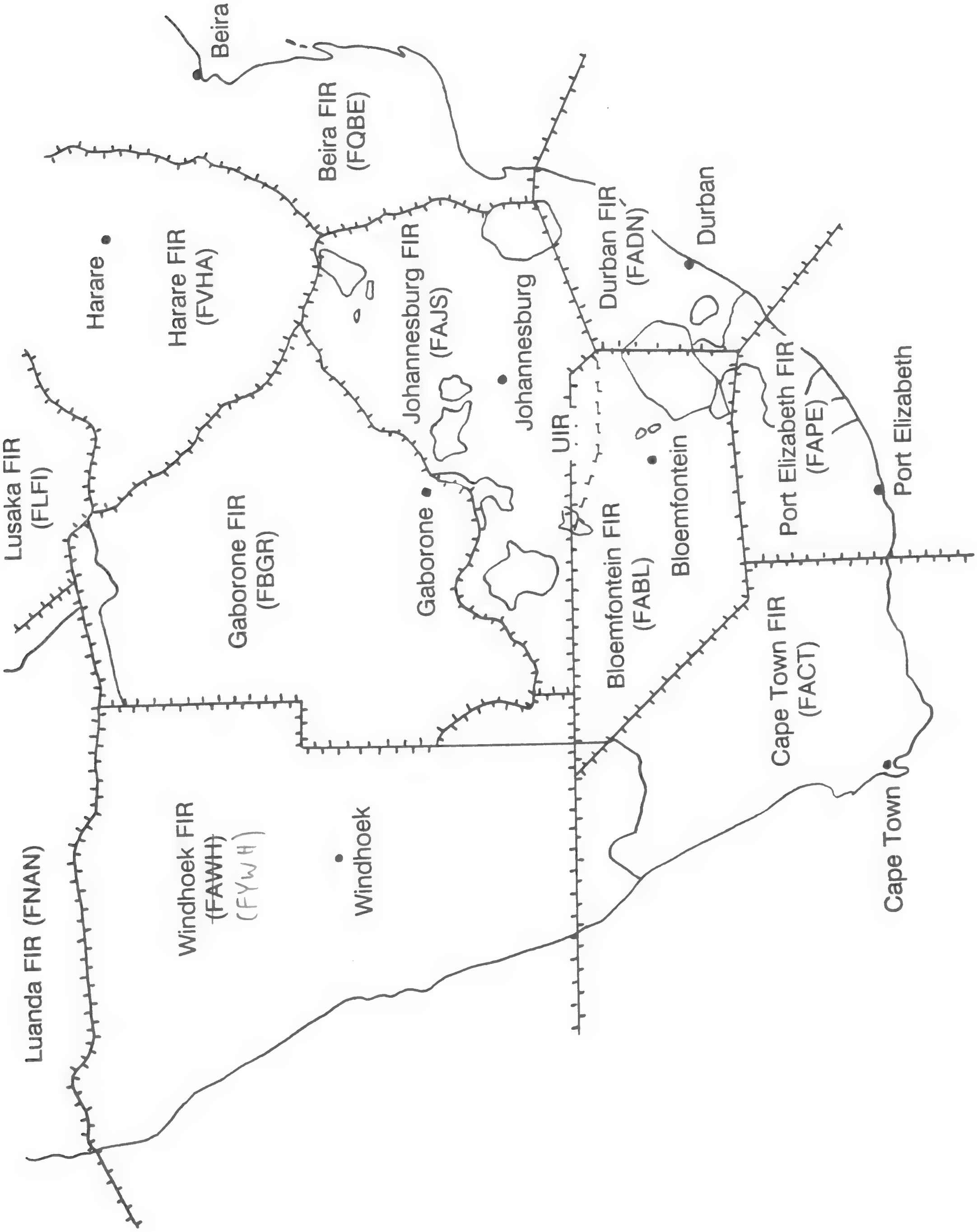
Note that the FIR boundaries do not necessarily correspond with provincial or international boundaries, refer to the map on page 13 for the boundaries of the Flight Information Regions. FIR boundaries are marked on aviation charts with a solid line with little stubs on either side.

All Flight Information Regions extend from the surface of the earth (Ground GND) upwards without an upper limit. Except that the areas covered by the Upper Flight Information Region (Johannesburg FIR and north-eastern part of the Bloemfontein FIR) extend from GND to Flight Level 195 (approximately 19500 feet above sea level). Above that the Upper Flight Information Region extends from FL195 upwards.

All airspace within the Flight Information Regions is declared as belonging to one of seven possible classes according to the table on page 14. Depending on the class of airspace, certain flights may not be allowed to enter that particular airspace. Air Traffic Controller involvement is different in different classes of airspace: it ranges from total control over the flight path of all flights on the one hand to a purely informative capacity on the other hand.

In the table on page 14 the words IFR (Instrument Flight Rules) and VFR (Visual Flight Rules) are used. Please refer to chapter 3 for an explanation of these terms.

FLIGHT INFORMATION REGIONS IN SOUTHERN AFRICA



The 7 classes of airspace according to ICAO:

Class	Permitted Flight Rules	Flights subject to control	Separation / Information
A	IFR only	all	all flights are separated from each other
B	IFR/VFR	all	all flights are separated from each other
C	IFR/VFR	all	IFR flights are separated from IFR and VFR VFR is separated from IFR VFR receives traffic information i.r.o. other VFR
D	IFR/VFR	all	IFR traffic is separated from other IFR flights IFR traffic receives traffic information about VFR VFR gets traffic information about all other flights
E	IFR/VFR	IFR only	IFR traffic is separated from other IFR flights all flights receive traffic info as far as practical
F	IFR/VFR	none	IFR flights receive traffic advisory service all traffic receives traffic information if requested
G	IFR/VFR	none	all traffic receives traffic information if requested

At present South Africa has only airspaces class A, C, F and G. Airspaces class A to F are listed in AIP RAC 3. Classification of airspace may change from time to time, and pilots are requested to consult the AIP when in doubt.

1.1 CONTROLLED AIRSPACE

(Ref: AIP RAC 3.0 - AIP RAC 3.1 - AIP RAC 3.2 - AIP RAC 3.3 - ROA 3.30 - ROA 6.1 - ROA 6.2)

Controlled Airspace is a three-dimensional block of air with lateral boundaries as well as lower and upper limits, in which control is exercised over all or some flights, depending on the class of airspace. Controlled flights will be separated from each other by Air Traffic Control (ATC) and must strictly adhere to ATC instructions. Therefore, every aircraft flying in controlled airspace must be equipped with a radio capable of maintaining two-way communications with the appropriate Air Traffic Service Unit (ATSU) on the designated frequency. Pilots flying in controlled airspace must also maintain a high standard of navigational ability and must supply ATC with accurate position estimates. A pilot flying from uncontrolled into controlled airspace must contact ATC at least 10 minutes before entering controlled airspace. Under special circumstances ATC may grant permission for an aircraft to fly within controlled airspace without being able to maintain two-way communications.

In class A, B, C and D all flights are controlled, in class E airspace only IFR flights are subject to air traffic control. In South Africa all airspace above Flight Level 195 is class A, where only IFR flights are permitted. All other controlled airspaces in South Africa at present are class C, where IFR and VFR flights are permitted, and where IFR traffic is separated from other IFR and from VFR traffic, VFR traffic is separated from IFR traffic and receives traffic information about other VFR flights.

Controlled airspace can take several forms:

1.1.1 ATZ - AERODROME TRAFFIC ZONE

(Ref: AIP RAC 3.3)

Aerodrome Traffic Zones can be established at airfields, usually comprising the circuit area either as a circle or as a racecourse pattern with up to a 15 nautical mile radius. They extend from ground level to an upper limit, usually around 1100 to 1500 feet above ground level (AGL). At present all ATZs in South Africa are class C airspace.

Some ATZ's in Namibia
(Grootfontein, Keetmanshoop,
Mpacha, Ondangwa, Swakop
mund) are class G airspac
(AIP July 93)

Example: Virginia ATZ
A circle radius 3 nm around Virginia airfield near Durban
Ground Level to 1100 feet GND

1.1.2 CTR - CONTROL ZONE

(Ref: AIP RAC 3.3)

Control Zones may be established around airfields as above for the protection of IFR traffic and may encompass one or more ATZs. They extend from ground level to an upper limit. At present all Control Zones in South Africa are class C airspace.

Example: J.B.M. Hertzog CTR
A racecourse pattern approximately 10 by 30 nm
Ground level to 6500 feet Altitude (ALT)

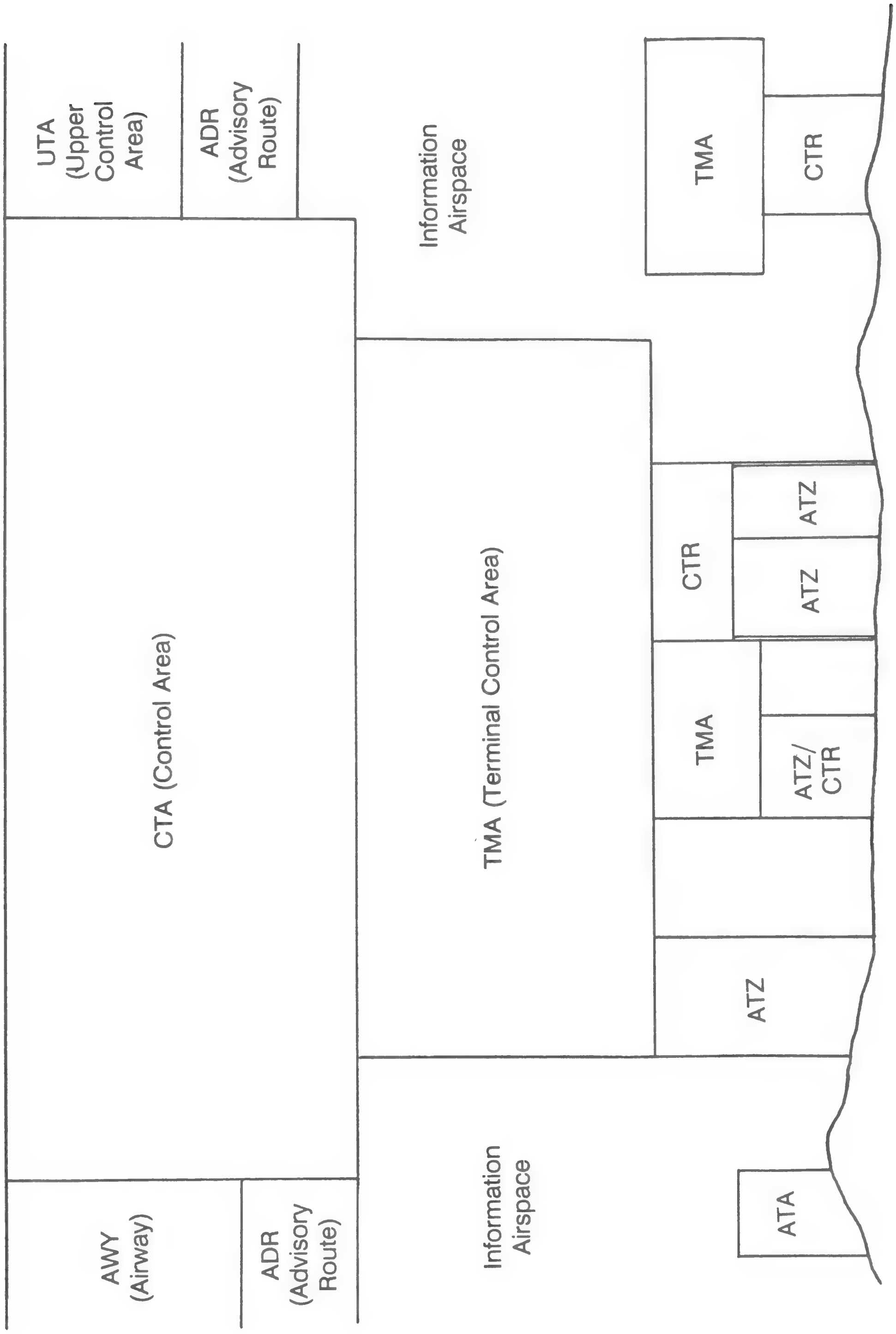
1.1.3 TMA - TERMINAL CONTROL AREA

(Ref: AIP RAC 3.1)

Terminal Control Areas may be established at the confluence of Air Traffic Service Routes. They extend from a lower to an upper limit and are usually positioned above one or more ATZs and/or CTRs. At present all TMAs in South Africa are class C.

Example: Johannesburg TMA
An oddly shaped area around Jan Smuts airport with extensions up to 50 nm
From 7600 feet altitude (ALT) to FL110.

SCHEMATIC DIAGRAM OF POSSIBLE AIRSPACE DIVISION



1.1.4 CTA - CONTROL AREA
(Ref: AIP RAC 3.1)

Control Areas are usually established above the TMA at busy centres. They extend from a lower to an upper limit. At present all CTAs in South Africa are class C airspace up to and including Flight Level 195, class A above FL195.

Example: Port Elizabeth CTA
A circle with a radius of 60 nm around H.F.Verwoerd airport in Port Elizabeth, with part of the circle excluded, and with two extensions past the perimeter of the circle included
From FL65 to FL195

1.1.5 UTA - UPPER CONTROL AREA
(Ref: AIP RAC 3.1)

Upper Control Areas are established as wide bands between two or more busy centres with more than one airport, so that flights can route direct from one airport to another in controlled airspace without having to follow established routes between navigational aids. They extend from a lower to an upper limit. All UTAs in South Africa are at present class C airspace up to and including Flight Level 195, class A above FL195.

Example: Cape Town UTA Area 'A'
A wide corridor between the Cape Town CTA boundary and Sutherland
From FL145 to FL460.

1.1.6 AWY - AIRWAY
(Ref: AIP RAC 3.2)

Airways may be established along frequently travelled routes, usually between navigational beacons. They have a certain width (which may not be constant), and a lower and upper limit. Airways are named with letters, *e.g.* W (Whiskey), UW (Upper Whiskey), A (Alpha), B (Bravo) or G (Golf), and numbers of two or three digits. At present all airways in South Africa are class C airspace up to and including FL195, class A above FL195.

Example: UW87 (Upper Whiskey Eight Seven)
From NDB (Non-directional beacon) Greyton near Cape Town via George to NDB Humansdorp, then continuing from East London to 'ASPIK' near Durban.
The width of this airway varies from 10 to 20 nm. Lower limit between Cape Town and Port Elizabeth is FL125, between East London and Durban FL145. The upper limit is FL460 throughout.

1.2 UNCONTROLLED AIRSPACE

(Ref: AIP RAC 3.2 - AIP RAC 3.4 - AIP RAC 3.5 - AIP RAC 3.6 - AIP RAC 5 - AIP RAC 6 - AIC 21.15)

All class F and G airspace is uncontrolled airspace, in which aircraft are not subject to Air Traffic Control and are not separated from each other. In class F airspace IFR flights will receive traffic advisory service, while VFR flights will receive traffic information if requested. In class ~~F~~ G airspace all aircraft in contact with an ATSU will receive traffic information if requested and as far as it is known.

Uncontrolled airspace can take several forms:

1.2.1 ADR - ADVISORY ROUTE

(Ref: AIP RAC 3.2)

An Advisory Route can be a lesser travelled air-route, or it may be established below an airway. An ADR has a certain width and a lower and upper limit. Advisory routes are named with a letter, e.g. A (Alpha), B (Bravo), G (Golf), W(Whiskey), a number consisting of two or three digits, and the letter D for Advisory.

Aircraft flying in advisory routes must be equipped with a radio capable of maintaining two-way communications. Advisory routes are class F airspace.

Example: W87D (Whiskey Eight Seven Advisory)
From NDB (Non-directional beacon) Greyton near Cape Town via George to NDB Humansdorp, then continuing from East London to 'ASPIK' near Durban (the advisory route below the airway UW87).
The width of this advisory route is 20 nm.
Lower limit is FL75, upper limit between Cape Town and Port Elizabeth is FL125, between East London and Durban FL145.

1.2.2 ADA - ADVISORY AREA

(Ref: AIP RAC 3.5)

An Advisory Area may be declared anywhere where it is helpful to air traffic. An ADA has lateral as well as lower and upper limits.

Aircraft flying in an advisory area must be equipped with a radio capable of maintaining two-way communications. Advisory areas are class F airspace.

Example: Durban Advisory Area
An area covering most of the Drakensberg
Lower limit is FL105, upper limit from 50 nm distance from Durban to 110 nm distance from Durban is FL125, beyond that the upper limit is FL205.

1.2.3 ATA - AERODROME TRAFFIC AREA

(Ref: AIP RAC 3.4)

An Aerodrome Traffic Area may be established at airfields, comprising the ground and circuit area at that airfield. In an ATA only Aerodrome Flight Information Service (AFIS) is supplied. That means information about the airfield is given, but no control is exercised. An ATA has certain lateral boundaries around the airfield and an upper limit. The lower limit will be the ground.

Aircraft flying in ATA must be equipped with radio capable of maintaining two-way communications. Aerodrome Traffic Areas are class ~~F~~ G airspace.

Example: Port Alfred ATA
Circle around the airfield with radius 5 nm
Lower limit Ground, upper limit 2000 feet above Ground.

1.2.4 INFORMATION ROUTE

(Ref: AIP RAC 3.2)

An Information Route is a lesser travelled air-route without a specified width and without lower or upper limits. Information Routes are named with a letter, *e.g.* A (Alpha), B (Bravo), G (Golf), W (Whiskey), a number consisting of two or three digits, and the letter F for Information. Information Routes are class F airspace.

Example: G655F (Golf Six Five Five Information)
Information Route between Maseru (Lesotho) and Meyerton NDB (MT) near Johannesburg.

1.2.5 FLYING TRAINING AREA

- Classified as danger areas (NOTAM A1049/31.12.92)

(Ref: AIP RAC 6)

Certain areas, usually near airfields where a lot of flying training takes place, may be declared as Flying Training Areas. These will have lateral boundaries as well as a lower and upper limit. Flying Training Areas are class ~~F~~ G. airspace.

Example: Johannesburg Flying Training Area
An area west of Johannesburg
Lower limit ground (except that over Prohibited Area FAP69 the lower limit is 2000' GND and above FAP80 the lower limit is 1000' GND), upper limit 7600' ALT below the Johannesburg TMA, otherwise FL100.

1.2.6 DANGER AREA
(Ref: AIP RAC 5 - AIC 21.15)

Danger Areas are airspaces where there might be danger to air traffic, *e.g.* military flying areas or missile firing ranges. They will have certain lateral as well as lower and upper limits. Danger areas are named FA (South Africa), followed by D (Danger), and a two or three digit number. These areas should be avoided when they are active. The nearest ATSU will usually be able to inform pilots about active periods. Danger Areas are class ~~F~~ G airspace.

Example: FAD26 (Danger Area 26)
Bloemfontein Military Jet Flying Area
East of Bloemfontein
Lower limit FL130, Upper limit UNL (Unlimited)

1.2.7 RESTRICTED AREA
(Ref: AIP RAC 5 - AIC 21.15)

Restricted Areas are airspaces which civilian aircraft may only enter with specific permission from the appropriate authority, usually military. In other words, movement of aircraft within these areas is restricted. They have certain lateral as well as lower and upper limits. Restricted areas are named FA (South Africa), followed by R (Restricted), and a two or three digit number. Restricted Areas are class ~~F~~ G airspace.

Example: FAR23 (Restricted Area 23)
Botteldulm Military Shooting Range
North of Upington, radius 14 nm
Lower limit Ground, Upper limit UNL (Unlimited)

1.2.8 PROHIBITED AREA
(Ref: AIP RAC 5 - AIC 21.15)

Prohibited Areas are airspaces which civil aircraft may not enter under any circumstances. They have certain lateral as well as lower and upper limits. Prohibited areas are named FA (South Africa), followed by P (Prohibited), and a two or three digit number. Prohibited Areas are class ~~F~~ G airspace.

Example: FAP60 (Prohibited Area 60)
Voortrekker Monument near Pretoria
Circle around the monument, radius 1.5 nm
Lower limit Ground, Upper limit 1000 feet above ground.

2. AIR TRAFFIC SERVICES

(Ref: ICAO Annex 11 - AIP RAC 0 - ROA 6 - ROA 7 - ROA 8)

Air Traffic Service at most civilian aerodromes in South Africa is provided by the Directorate: Air Traffic Services of the Department of Transport. Military airfields fall under the jurisdiction of the Airforce, and for some smaller civilian airfields the owner of the airfield may provide Air Traffic Service.

2.1 OBJECTIVES

The objectives of Air Traffic Services are:

- to prevent collisions between aircraft
- to prevent collisions between aircraft on the manoeuvring area and obstructions
- to expedite and maintain an orderly flow of air traffic
- to provide advice and information useful for the safe and efficient conduct of flight
- to notify appropriate organisations regarding aircraft in need of Search and Rescue (SAR) and to assist such organisations as required.

2.2 TYPES OF SERVICES

(Ref: ICAO Annex 11 - AIP RAC 0 - ROA 6 - ROA 7 - ROA 8)

There are three types of Air Traffic Services:

- Control Service
- Flight Information Service including Advisory Service
- Alerting Service

2.2.1 CONTROL SERVICE

(Ref: ICAO Annex 11 - AIP RAC 0 - ROA 6)

Control Service is provided to IFR traffic in class A, B, C D and E airspace, to VFR flights in class B, C and D airspace, further to all Special VFR flights and to all aerodrome traffic at controlled airfields. Or, a bit simpler, Control Service is provided in all controlled airspaces. Control Service "controls" air traffic, that means issues clearances and instructions (headings, speeds, altitudes), which must be adhered to. If a particular instruction cannot be complied with, the pilot may deviate from the issued instruction, but Air Traffic Control must be notified immediately.

Example: ATC instructs a VFR pilot to climb to 6500 feet in controlled airspace for separation purposes. Unbeknown to ATC, but visible to the pilot, the cloud base is at 6000 feet. The pilot must then advise ATC: "Unable to comply due to cloud at 6500 feet", after which ATC will issue another clearance to resolve the traffic conflict.

There are three types of Control Service:

- Area Control Service
- Approach Control Service
- Aerodrome Control Service

2.2.1.1 AREA CONTROL SERVICE

(Ref: AIP RAC 3 - ROA 6)

Area Control Service controls VFR and IFR flights in CTAs and Airways. It will issue instructions like Flight Levels or altitudes to fly, headings or routes to be flown and may issue minimum or maximum speed limits. It will also pass on any other useful information, *e.g.* the weather at destination or en route, information about hazardous weather conditions (*e.g.* icing) received from other pilots, any unserviceability of facilities at destination or en route as well as Onward Clearance Times (OCTs) if en-route delays are expected or Expected Approach Times (EATs) if there is a delay with the approach.

The radio call sign for Area Control Service is composed of the name of the Flight Information Centre providing the service and the word CONTROL or AREA for service in CTAs, and the word AIRWAYS for service along airways. In practice, the word CONTROL, AREA or AIRWAYS is often omitted. At less busy airports, Area Control may be combined with Approach Control and take on the call sign of the Approach Control, *e.g.* "East London Approach".

Example: The Bloemfontein FIR at present comprises two Upper Control Areas (Bloemfontein and Upington UTAs), two Control Areas (Bloemfontein and Upington CTAs) as well as several airways, TMAs and CTRs. The Bloemfontein UTA and CTA are controlled by the Bloemfontein Area Control Centre (ACC) with the call sign "Bloemfontein Control". In the Upington UTA, area control is provided by the Upington ACC with the call sign "Upington Control", while in the Upington CTA area control takes on the call sign of aerodrome control, namely "Van Ryneveld Tower". All airways in the Bloemfontein FIR fall under the Bloemfontein ACC with the call sign "Bloemfontein Airways".

2.2.1.2 APPROACH CONTROL SERVICE

(Ref: AIP RAC 3 - ROA 6)

Approach Control Service controls VFR and IFR flights in a TMA. Furthermore, IFR and Special VFR flights, when flying in Instrument Meteorological Conditions (IMC), are subject to Approach Control until they have landed and cleared the runway when arriving, and from the moment they enter the runway to take off when departing. In Visual Meteorological Conditions (VMC) aircraft are given Approach Control Service from the time they get handed over from Area Control until they get passed on to Aerodrome Control (Tower) when arriving, and vice versa when departing. Clearances and instructions include Flight Levels or altitudes to be flown, headings to fly, QNH, Transition Level and runway in use to inbound traffic, turns after take-off to departing traffic, plus any other useful or necessary information.

The radio call sign for Approach Control Service is composed of the name of the Flight Information Centre providing the service and the word APPROACH. At smaller centres, where Approach and Aerodrome Control Service are combined, the call sign for Approach Control may be the same as for Aerodrome Control, *e.g.* name of airfield and the word TOWER.

Example: The Cape Town FIR comprises, amongst other controlled airspace, three Terminal Control Areas (TMAs): Cape Town, Overberg and George. In the Cape Town TMA Approach Control is provided by "Cape Town Approach", in the Overberg TMA by "Bredasdorp Approach", and in the George TMA Approach Control Service is combined with Aerodrome Control Service as "Botha Tower".

2.2.1.3 AERODROME CONTROL SERVICE

(Ref: AIP RAC 3.3 - ROA 6)

Aerodrome Control Service controls all traffic in ATZs and CTRs in Visual Meteorological Conditions (VMC), i.e. aircraft on the taxiways as well as aeroplanes flying in the circuit. In Instrument Meteorological Conditions (IMC) Aerodrome Control Service is provided only to aircraft on taxiways, not to aircraft on the runway or in the circuit. In IMC, traffic in the circuit and on the runway is controlled by Approach Control, as stated in the previous chapter.

Aerodrome Control may be divided into Aerodrome Control proper with the call sign TOWER, controlling aircraft on the runway in use and in the circuit area, and into Surface Movement Control (SMC) with the call sign GROUND, controlling aircraft on the taxiways. At present, only Johannesburg/Jan Smuts, Cape Town/D.F. Malan and Lanseria as well as most military airfields use a separate frequency to control surface movements. The words TOWER or GROUND are always preceded by the name of the airfield, *e.g.* "Hertzog Tower" in Bloemfontein or "Malan Ground" in Cape Town.

Temporary ATZs may be established when needed, for example for the EAA Convention at Margate or for other airshows or events. These will be published in NOTAMs.

2.2.2 FLIGHT INFORMATION SERVICE

(Ref: AIP RAC 0.1 - ROA 7)

Information Service provides pilots with information which may be useful to them. It will not issue clearances or instructions and will not provide traffic or terrain separation, but may warn pilots about conflicting traffic, if that traffic is known.

Information Service is provided in all airspaces, controlled and uncontrolled, as long as two-way radio contact can be maintained.

The radio call-sign of Flight Information Service will be the name of the Flight Information Centre providing the service plus the word INFORMATION, *e.g.* "Durban Information".

2.2.2.1 AERODROME FLIGHT INFORMATION SERVICE (AFIS)

(Ref: AIP RAC 3.4 - ROA 7)

AFIS is given to all aircraft operating within an Aerodrome Traffic Area (ATA). Aerodrome Flight Information Service, as the name implies, will issue information only, not give clearances or instructions. The phraseology will be something like "the runway is clear" instead of "cleared to land". Pilots should use similar wording, *e.g.* say "ready to taxi" instead of requesting taxi instructions.

Aerodrome Flight Information Service may declare an airfield IMC, that means closed to VFR traffic due to weather.

AFIS will pass on any necessary information to pilots about the airfield, the weather, and other traffic. AFIS will inspect the airfield and mark temporary obstructions. It will provide emergency flare-paths when necessary. AFIS will also relay messages between pilots and operators (*e.g.* a charter company) as well as between pilots and Flight Information Centres or Area Control Centres (*e.g.* IFR and other clearances). Furthermore, AFIS will maintain a NOTAM filing system for pilot briefing purposes.

The call-sign of an AFIS unit shall be the name of the airfield plus the word RADIO, *e.g.* "Port Alfred Radio". At present, only three airfields in South Africa offer AFIS on a regular basis, i.e. Alexander Bay, Lanseria outside normal Air Traffic Control hours, and Port Alfred.

Temporary ATAs may be declared when needed. This happens usually when an airshow or similar event takes place and will be announced in a NOTAM.

2.2.3 ALERTING SERVICE

(Ref: ROA 8)

Alerting Service is provided in all airspaces by all Air Traffic Service Units (ATSUs) to all aircraft in need of Search and Rescue (SAR). For further information please refer to chapter 11.

3. FLIGHT RULES

(Ref: AIP RAC 1.6 - ROA 4 - ROA 5 - AIC 40.4)

A pilot can elect to fly under one of two sets of Flight Rules during any one stage of his flight:

- VFR Visual Flight Rules
- IFR Instrument Flight Rules.

The legal terms VFR and IFR must not be confused with the meteorological terms:

- VMC Visual Meteorological Conditions
- IMC Instrument Meteorological Conditions.

Whereas VMC and IMC refer to the prevailing weather conditions, VFR and IFR refer to the current rules a certain flight is operating under. VFR flight is possible and legal only in VMC, IFR flight is possible in VMC as well as in IMC.

3.1 VISUAL FLIGHT RULES (VFR)

(Ref: AIP RAC 1.6 - AIC 40.4 - ROA 4)

An aircraft may be flown according to Visual Flight Rules (VFR) when the pilot can maintain visual contact with the ground, when the aircraft is not above more than 3/8 of cloud within a 5 nm radius of the aircraft, and when the following minima with regard to visibility and distance from cloud can be adhered to:

AEROPLANES

Airspace	Visibility	Distance from cloud	
		horizontally	vertically
CTR/ATZ/ATA	5 km	2000 feet	500 feet
Other airspaces:			
Ground to 1000' AGL by day	1.5 km	Clear of cloud	
1000' AGL to FL100 by day Ground to FL100 by night	5 km	2000 feet	500 feet
FL100 to FL195 by day or night	8 km	1.5 km	1000 feet

In addition, for aeroplanes flying visually in a CTR, ATZ or ATA the ceiling[1] must be at least 1500 feet, with the exception that an aeroplane may take off and leave for a cross-country flight in an ATZ or ATA (which are not part of a CTR) if the ceiling is at least 500 feet.

Examples: 1. the ceiling in the Lanseria ATZ/CTR is 1000 feet. VFR is not possible (but see chapter 3.3 for Special VFR).

2. the ceiling in the Rand ATZ is 1000 feet. It is legal to take off and leave the ATZ for a VFR cross-country flight, but it is not legal to do circuits at Rand under these weather conditions.

HELICOPTERS

Airspace	Visibility	Distance from cloud	
		horizontally	vertically
CTR/ATZ/ATA	2.5 km	1000 feet	clear of cloud
Other airspaces:			
Ground to 1500' AGL by day	1 km	Clear of cloud	
Ground to 1500' AGL by night	5 km	Clear of cloud	
Above 1500' AGL by day or night	5 km	2000 feet	500 feet

In addition, for a helicopter flying in a CTR, ATZ or ATA the ceiling must be at least 600 feet.

If the above mentioned minima for aeroplanes or helicopters are not given, the weather is said to be IMC and aircraft may not be flown under VFR. In an ATA, ATZ or CTR Air Traffic Control will determine whether the area or zone is VMC or IMC. In all other airspaces it is the pilot's responsibility to decide whether flight under VFR is possible or not, and therefore those minima should be memorised by every VFR pilot.

VFR flight is not permitted above FL195.

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[1] 'Ceiling' is defined as the height above ground or water of the base of the lowest layer of cloud below 20000' covering more than half the sky.

3.2 INSTRUMENT FLIGHT RULES (IFR)

(Ref: AIC 40.4 - ROA 5)
(General Licence only)

If the minima detailed above are not given, Instrument Meteorological Conditions (IMC) prevail and aircraft must be flown according to Instrument Flight Rules. Aircraft must also be flown under IFR at FL200 or above. For this, the pilot must be Instrument Rated and the aircraft equipped for Instrument Flight. It also means that larger fuel reserves must be carried than on a VFR flight and that certain other rules have to be complied with.

3.3 SPECIAL VFR (SVFR)

(Ref: AIC 40.4 - AIC 45.1)

Air Traffic Control (ATC) may grant Special VFR to an aircraft to leave a CTR for a cross-country flight or to arrive in a CTR from a cross-country flight by day only, provided that:

- ground visibility is at least 1 nm
- the aircraft stays clear of cloud
- the aircraft stays within sight of the ground.

Whether or not ATC will grant Special VFR to a flight depends on traffic situation and other factors. Special VFR is a privilege, not a right.

When granting an SVFR clearance the Air Traffic Controller will apply the separation standards associated with IFR flights, therefore delays may be encountered. Note also that because the zone is IMC, the approach controller (rather than the aerodrome controller) issues all clearances for flights in the CTR. This clearance is relayed to the aircraft by the aerodrome controller, who has to communicate with the approach controller via the intercom before being able to grant any clearance or issue any instruction.

When granted Special VFR it is the pilot's responsibility to stay clear of cloud and within sight of the ground. Normal minimum heights must still be observed, i.e. over built-up areas the aircraft must stay at least 1000 feet above the highest obstacle within a 2000 feet radius. An SVFR clearance ends at the CTR boundary, thereafter the normal VFR minima as stated in 3.1 apply.

4. ALTIMETER SETTING PROCEDURES

(Ref: AIP RAC 2 - AIC 20.2 - AIC 43.2)

The altimeter is a barometer which is calibrated to indicate altitude in feet rather than atmospheric pressure in hectoPascals (hPa). A drop of 1 hPa corresponds to roughly 30 feet increase in altitude up to about 10 000 feet. Since actual atmospheric pressure varies from day to day and place to place, the altimeter subscale must be set to a certain datum or pressure level. The datum selected will determine what exactly the altimeter is to indicate.

4.1 DEFINITIONS

(Ref: AIP RAC 2 - AIC 20.2)

The datums used are:

QNH: Actual present atmospheric pressure at a place corrected for sea level. Sea level is the datum, therefore, the altimeter will show ALTITUDE (= height above sea level). When on the ground at an airfield, the altimeter will show the elevation of that airfield.

QFE: Actual atmospheric pressure at a place. Ground level is the datum, therefore the altimeter will show HEIGHT above ground. When on the ground at an airfield, the altimeter will show zero.

Standard Setting 1013.2 hPa: A fictitious datum, which can be below, at or above sea level, depending on the actual atmospheric pressure prevailing. Vertical distance from this datum is expressed as a FLIGHT LEVEL, whereby the last two zeroes are ignored, *e.g.* altimeter shows 7500 feet = FL75.

With the above in mind the following terms can be defined:

Altitude: Vertical distance from sea level to an object above the earth's surface, i.e. an aircraft in flight. Shown on the altimeter only when the present QNH for that particular area is set in the altimeter subscale.

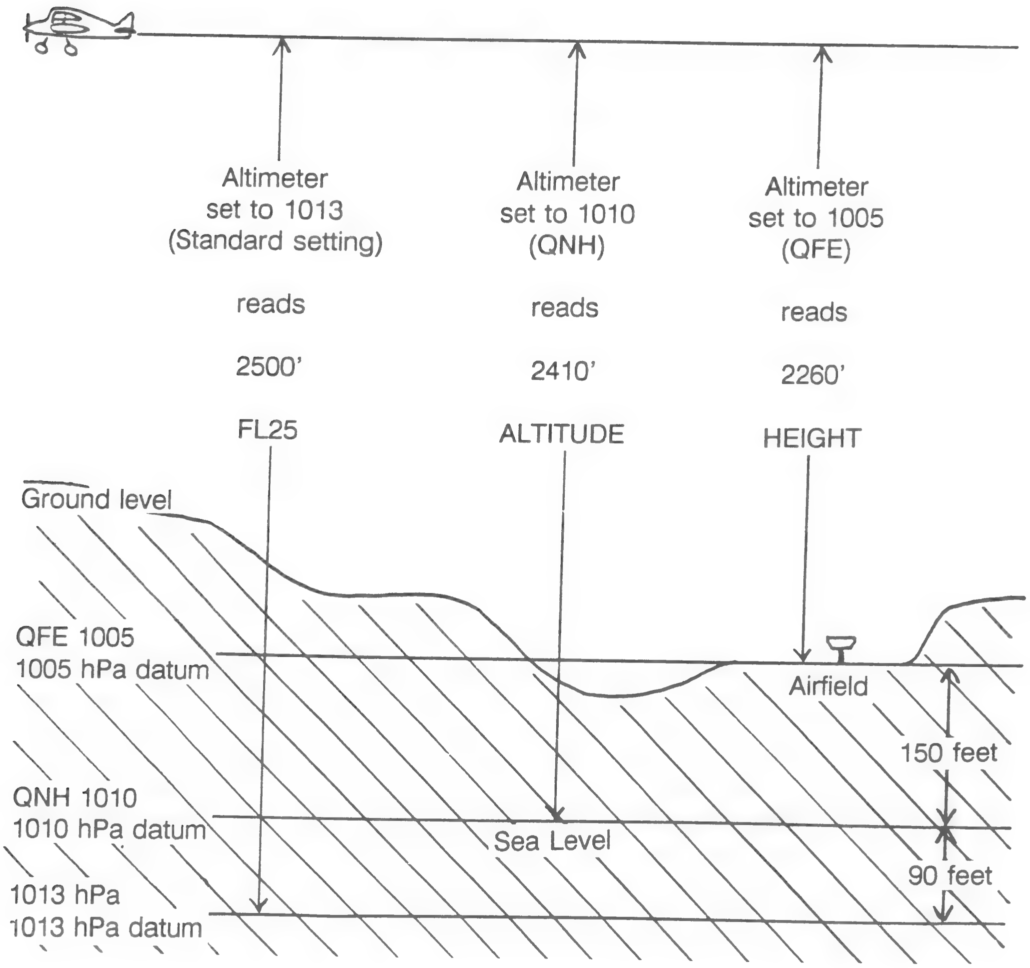
Elevation: Vertical distance from sea level to a point on the earth's surface, *e.g.* an airfield.

Height: Vertical distance between the ground and the aircraft. Height will be shown on the altimeter only when QFE is set on the subscale. The height shown is the height above the airfield to which the QFE applies. If the aircraft then flies over a mountain, the altimeter will still show height above the airfield, not height above the mountain.

Flight Level: Vertical distance between the 1013.2 hPa level and the aircraft. A Flight Level will be shown on the altimeter only when the Standard Setting of 1013.2 hPa is set in the subscale. Flight Levels start at the 1013.2 hPa level as Flight Level zero and are separated by a pressure interval corresponding to 500 feet in the International Standard Atmosphere.

QNE: Altimeter indication in feet at a certain airfield with 1013.2 hPa set in the subscale. In other words, the QNE is the "Flight Level" (expressed in feet) of the airfield, or, more accurately, the "Pressure Altitude" of that airfield. Note that QNE is not a pressure but an altitude.

DIAGRAMMATIC EXPLANATION OF HEIGHT - ALTITUDE - FL



4.2 PRACTICAL APPLICATION

(Ref: AIP RAC 2 - AIC 20.2)

When flying low-level or in the vicinity of an airfield after take-off or before landing, it is more sensible to operate on altitude, therefore QNH must be set in the subscale of the altimeter.
En route, where aircraft coming from various places with different local QNH settings meet, it makes more sense for everybody to be on one standard setting, namely 1013.2 hPa.

Therefore, the following rules have been established:

- Aircraft must fly with QNH set in the subscale of their altimeters and express their vertical position in terms of ALTITUDE when
  - in the circuit
  - within 25 nm of an aerodrome below Transition Altitude
  - on cross-country flights at less than 1500' AGL

- Aircraft must fly with 1013.2 hPa set in the subscale of their altimeters and express their vertical position in terms of FLIGHT LEVELS when
  - within 25 nm of an aerodrome above Transition Level
  - on cross-country flights above 1500' AGL

- Aircraft must change from QNH to 1013.2 hPa when
  - climbing through Transition Altitude
  - 25 nm from the departure airfield for cross-country flights conducted above 1500' AGL

- Aircraft must change from 1013.2 hPa to QNH when
  - descending through Transition Level
  - 25 nm from the destination airfield if their cross-country flight was conducted above 1500' AGL

See diagram on page 32 for further explanation.

4.3 TRANSITION ALTITUDE

(Ref: AIP RAC 2.2 - AIC 20.2)

Transition Altitude is the altitude at which a climbing aircraft shall change the subscale setting of its altimeter from local QNH to Standard Setting 1013.2 hPa.
Transition Altitudes for South African airfields are specified as follows:

Alexander Bay	6000'
Bisho (Ciskei)	7000'
Bloemfontein (J.B.M.Hertzog)	7500'
Cape Town (D.F.Malan)	7500'
Durban (Louis Botha)	5500'
East London (Ben Schoeman)	7000'
George (P.W.Botha)	8000'
Giyani	~~5000'~~ 5500'
Grootfontein	9000'
Johannesburg (Jan Smuts and Rand Airport)	8000'
Keetmanshoop	5500'
Kimberley (B.J.Vorster)	7000'
Kleinsee	4500'
Ladysmith	9500'
Lanseria	8000'
Lydenburg	7500'
Margate	5000'
Messina	7000'
Mmabatho (Bophuthatswana)	7000'
Newcastle	9500'
Phalaborwa (Hendrik van Eck)	3500'
Pietermaritzburg (Oribi)	8500'
Pietersburg (Civil)	9000'
Port Elizabeth (H.F.Verwoerd)	5500'
Pretoria (Wonderboom)	8000'
Richardsbay	3500'
Secunda	8000'
Sishen	8000'
Skukuza	9000'
Tzaneen	8500'
Ulundi	~~6500'~~ 7100
Umtata (K.D.Matanzima)	7500'
Upington (Pierre van Ryneveld)	5500'
Welkom	7000'
Windhoek	10000'

For any airfields not listed above, the following applies:

Airfields within 25 nm of the above	as above
Airfields more than 25 nm from above in VMC	2000' AGL
Airfields more than 25 nm from above in IMC	Lowest Safe Cruising Altitude

4.4 TRANSITION LEVEL

(Ref: AIP RAC 2.2 - AIC 20.2)

Transition Level (TL) is the Flight Level at which a descending aircraft shall change the subscale setting of its altimeter from 1013.2 hPa to local QNH.

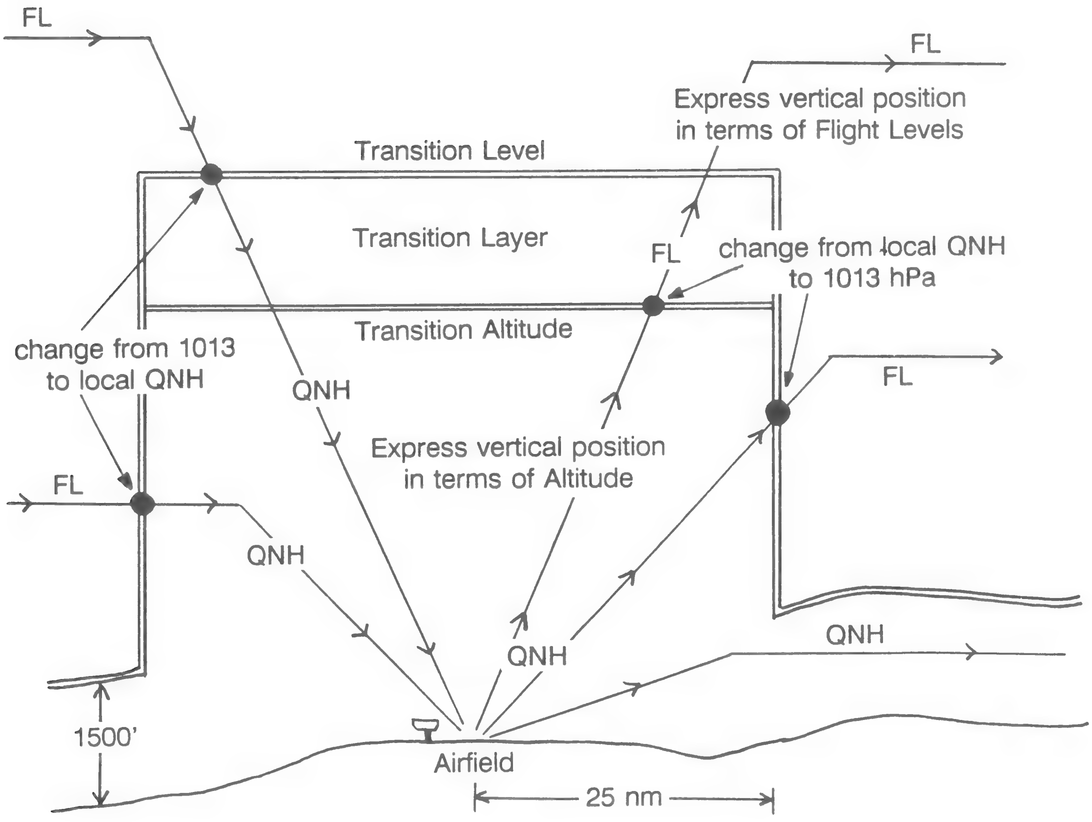
Transition Levels are determined by ATC and shall be 1000 feet or more above Transition Altitude. At unmanned airfields within a 25 nm radius from a controlled aerodrome the Transition Level of that controlled airfield applies.

At unmanned airfields more than 25 nm from a controlled aerodrome the TL shall be:

- in VMC: 3000 feet AGL
- in IMC: the nearest Flight Level 500 feet above the lowest safe altitude.

(last line General Licence only)

DIAGRAM - ALTIMETER SETTING PROCEDURES



5. SEMI-CIRCULAR RULE

(Ref: ROA 3.3)

To ensure vertical separation between aircraft, level flight at or above 1500' AGL has to be conducted in accordance with the semi-circular rule. Except that in controlled airspace ATC may assign specific altitudes or flight levels without regard to this rule.

From the table below note that above FL195 all flights must be conducted in compliance with IFR. Also note that separation is increased above FL290.

MAGNETIC TRACK from:	000 to 179		180 to 359	
Flight Rules:	IFR	VFR	IFR	VFR
Flight Levels:	-	15	20	25
	30	35	40	45
	50	55	60	65
	70	75	80	85
	90	95	100	105
	110	115	120	125
	130	135	140	145
	150	155	160	165
	170	175	180	185
	190	195	200	-
	210	-	220	-
	230	-	240	-
	250	-	260	-
	270	-	280	-
	290	-	310	-
	330	-	350	-
	370	-	390	-
	410	-	430	-
	etc.		etc.	

(The Semi-circular Rule in respect of IFR flights is relevant to the General Licence only).

6. FLIGHT PLANS

(Ref: ICAO DOC 4444 - AIP RAC 1 - AIC 42.1 - ROA 3.27)

A Flight Plan (form TV2/120A, obtainable from ATC centres or flight schools) is a coded description of the details of a particular flight, which is provided to Air Traffic Service Units before the flight is commenced or at least before the flight enters controlled airspace. It aids in traffic planning and provides information in case Search and Rescue becomes necessary.

6.1 WHEN A FLIGHT PLAN IS MANDATORY

(Ref: AIP RAC 1.1 - AIC 42.1 - ROA 3.27)

A Flight Plan **may** be filed for any flight, it **must** be filed for the following flights:

1. All flights to be conducted wholly or partly in controlled or advisory airspace, except:
    - a local flight
    - a flight crossing an airway or advisory route at right angles
    - a VFR flight taking off in a CTR or ATZ to fly to an uncontrolled airfield or vice versa, and not entering any other controlled or advisory airspace.

2. Any international flight.

3. All flights in the public transport category, *e.g.* charter, scheduled flights and cargo flights.

4. Any flight for which alerting action is required.

Example: 1. A Private Pilot wishes to take off from H.F.Verwoerd airport in Port Elizabeth to fly to Plettenberg Bay at 1000 feet AGL along the coast. He will be leaving the Port Elizabeth CTR (upper limit 1500') and will not enter any other controlled airspace. A Flight Plan is **not** necessary.

2. Another pilot wants to fly the same route, but at FL45. Since he will be entering the Port Elizabeth TMA (lower limit 1500' AGL), a Flight Plan **is** necessary.

3. Yet another pilot plans to fly from Port Elizabeth to George, along the coast at 1000'. He will not be entering the Port Elizabeth TMA, but he will at the end of his flight, enter the George ATZ/CTR. Therefore, a Flight Plan **is** necessary.

6.2 HOW TO FILE A FLIGHT PLAN

(Ref: AIC 42.1 - ROA 3.27 - NOTAM A023/92)

A Flight Plan may be filed by telephone, by FAX or in person with the nearest Air Traffic Service Unit (ATSU) at least 30 minutes before departure.

A Flight Plan may only be filed over the radio if from the airfield of departure the pilot would have had to book a trunk telephone call to the nearest ATSU. In this case the flight plan must be filed over the air at least 10 minutes before entering controlled or advisory airspace.

If a Flight Plan has not been activated (that means first contact established between aircraft and ATSU via the radio) within one hour of the departure time stipulated in the Flight Plan, the Flight Plan will automatically be cancelled. If a flight is delayed for more than one hour the pilot must either amend the old Flight Plan or file a new one.

When a pilot takes off from a very remote airfield and remains relatively low level it could be possible that there is no radio contact with any ATSU for one hour after departure. That means the Flight Plan will automatically be cancelled. In this instance the pilot may telephone any ATSU immediately prior to take-off and advise them of the anticipated departure time, thus activating the Flight Plan.

A separate Flight Plan must be filed for different legs of a flight.
Example: For a flight from Rand to Windhoek with a refuelling stop at Upington two Flight Plan forms must be completed: one for the Rand-Upington leg, a second one for the Upington-Windhoek leg.

6.3 AMENDMENT OF FLIGHT PLANS

(Ref: AIP RAC 1.3 - AIC 42.1 - ROA 3.27)

A pilot may at any time request a change to the Flight Plan, *e.g.* to avoid adverse weather. This requested change must be approved by ATC before the pilot may implement this change.

If, due to an emergency, the aircraft deviates in any respect from the filed Flight Plan, ATC must be notified as soon as possible.

If the aircraft is off track, the heading must be adjusted to regain track as soon as possible.

If during flight the True Airspeed (TAS) changes by +/- 5% or more from the TAS nominated in the Flight Plan (*e.g.* due to a failed engine in a twin-engine aircraft) or if the time at the next reporting point or destination is expected to change by more than +/- 3 minutes, ATC must be notified via the radio.

6.4 CLOSING OF A FLIGHT PLAN

(Ref: AIP RAC 1 - AIC 42.1 - ROA 3.27)

A Flight Plan will be closed automatically when landing at a controlled airfield. When landing at an uncontrolled airfield, the pilot must notify ATC immediately before or after landing if Search and Rescue was requested. This may be done over the radio by transmitting something like "field in sight, landing in 5 minutes, please close my flight plan" to ATC. Or it may be done by telephone after landing. Should a pilot fail to close his flight plan and alerting action was requested, this could result in an unnecessary and costly search, for which the pilot may be held financially responsible.

6.5 THE FLIGHT PLAN FORM

(Ref: AIP RAC 1.2 - AIC 42.1 - ROA 3.27)

The Flight Plan form (TV2/120A) is divided into shaded and white areas. The shaded areas are for ATC use only and should not be completed by pilots. The white areas must be completed according to the following instructions. Data must be inserted starting with the leftmost space for each item. When all spaces are not needed, trailing spaces must be left blank.

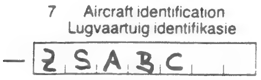
In the instructions the most common cases for private VFR flights are given first and are marked in **bold**. Specifications not marked in **bold** apply to the *General Radio Licence only* and do not have to be studied or understood by candidates for the Restricted Licence.

Item 7: AIRCRAFT IDENTIFICATION (up to 7 characters)

Insert the aircraft radio call sign to be used in flight:

ZSABC	**Zulu Sierra Alpha Bravo Charlie** **(the registration marks of the aircraft without the hyphen)**
BE55ABC	Beech Baron 55 Alpha Bravo Charlie (the aircraft type designator followed by the last three letters of the registration marks)
MNZSABC	Comair Zulu Sierra Alpha Bravo Charlie (operating agency designator plus the five letters of the registration marks)
SA345	Springbok (South African Airways) Three Four Five (operating agency designator plus last three letters of the registration marks)
ZZZZ	for irregular call signs on internal flights only. Specify in item 18, *e.g.* ZZZZ/Blue Formation

Example: Aircraft with call sign ZS-ABC


7 Aircraft identification
Lugvaartuig identifikasie
— ZSABC

Item 8: FLIGHT RULES (1 character)

Insert

V	**VFR**
I	IFR
Y	IFR first, then VFR (point at which flight rules change must be marked in item 15)
Z	VFR first, then IFR (point at which flight rules change must be specified in item 15)

TYPE OF FLIGHT (1 character)

Insert

G	**General Aviation**
S	Scheduled air transport (*e.g.* Flitestar)
N	Non-scheduled air transport (*e.g.* charter)
M	Military flights
X	Mercy flight, Ambulance flight or Ferry flight with one or more engines inoperative (give reason in item 18 under STS/)
P	SAAF VIP flight, with a Head of State on board (person to be specified in item 18 under STS/)

Example: General aviation flight adhering to Visual Flight Rules

8 Flight rules
Vliegreëls
— V
Type of flight
Tipe vlug
G <<≡

Item 9: NUMBER OF AIRCRAFT (up to 2 characters)

Leave blank if Flight Plan is for one aircraft only.

Insert the number of aircraft if more than one.

TYPE OF AIRCRAFT (4 characters)

Insert the appropriate aircraft type designator.

Insert

ZZZZ	if no designator has been assigned or if more than one type in the formation. In that case specify type in item 18 under TYP/.

(Some ICAO designators for popular aircraft are listed in Appendix V)

WAKE TURBULENCE CATEGORY (1 character)

Insert

L	**Light, for aircraft up to 7000 kg**
M	Medium, for aircraft above 7000 kg but less than 136000 kg
H	Heavy, for aircraft of 136000 kg or more

Example: Only 1 aircraft, a Piper Arrow, Wake Turbulence category Light, less than 7000 kg.

9 Number Nommer	Type of aircraft Tipe lugvaartuig	Wake turbulence cat Volgstroomklas
	PARO	L

Item 10: COM AND NAV EQUIPMENT

Insert one or more of the following letters to indicate which radio equipment (Communication and Navigational equipment) is available in the aircraft:

A	Loran A (Navigational aid)
C	Loran C (Navigational aid)
D	**DME (Distance Measuring Equipment)**
E	Decca (Navigational aid)
F	**ADF (Automatic Direction Finding)**
H	HF RT/F (High Frequency Radiotelephony)
I	INS (Inertial Navigation System)
L	**ILS (Instrument Landing System)**
M	Omega (Navigational aid)
O	**VOR (VHF Omni Range)**
P	Doppler (Navigational aid)
R	RNAV (Route Navigation aid)
S	**Standard equipment: VHF RT/F, ADF, VOR and ILS**
T	Tacan (Navigational aid)
U	UHF RT/F (Ultrahigh Frequency Radio)
V	**VHF RT/F (Very high frequency radio)**
Z	other equipment (specify in item 18 under COM/ or NAV/ as applicable)

SSR (SECONDARY SURVEILLANCE RADAR) EQUIPMENT (1 character)

Insert one of the following to indicate which serviceable SSR equipment is carried in the aircraft:

N	**No SSR**
A	**Mode A (4 digits - 4096 codes)**
C	**Mode A and C (altitude encoding)**
X	Mode S (without altitude or aircraft identification)
P	Mode S (with altitude but without aircraft identification)
I	Mode S (without altitude but with aircraft identification)
S	Mode S (with altitude and aircraft identification)

Example: The aircraft is equipped with Standard equipment (VHF radio, ADF, VOR, ILS), with DME and with a 4-digit transponder Mode A only.

10 Equipment
Toerusting
— SD / A <<≡

Item 13: DEPARTURE AERODROME (4 characters)

Insert the ICAO four letter location indicator of the departure aerodrome.

Insert

ZZZZ	if no location indicator has been assigned (specify in item 18 under DEP/ the name of the departure airfield).

TIME OF DEPARTURE (4 figures)

Insert the estimated off-block time in UTC (off-block time is the time the aircraft starts taxying to the holding point).

Example: The aircraft will depart Durban at 0600 UTC, which is 8 am South African Time.

13 Departure aerodrome
Vertrek vliegveld
— FADN

Time
Tyd
0600 <<≡

Item 15: CRUISING SPEED (up to 5 characters)

Insert the True Airspeed (TAS) of the aircraft as:

N	**followed by four figures, expressing the speed in knots,** *e.g.* **N0115 = 115 knots**
M	followed by three figures, expressing the speed as a Mach number for supersonic flights only, *e.g.* M082 = Mach 0.82
K	followed by four figures, expressing the speed in kilometres per hour, *e.g.* K0830 = 830 km/h

LEVEL (up to 5 characters)

Insert the planned cruising level for the first part of the flight or the whole flight in the following manner:

F	**followed by three figures denoting the Flight Level,** *e.g.* **F085 = Flight Level 85.**
A	**followed by three figures denoting the altitude in hundreds of feet,** *e.g.* **A015 = 1500 feet Altitude.**
VFR	**for uncontrolled VFR flights. When choosing this option, the aircraft must still adhere to the semi-circular rule when flying at or above 1500 feet AGL.**

ROUTE (INCLUDING CHANGES OF SPEED, LEVEL OR FLIGHT RULES)

Insert the route to be flown as accurately as possible. This can be done in various ways:

If the aircraft wants to follow a designated ATS route (Airway, Advisory or Information Route) insert the designator of the ATS route, *e.g.* W87D.

If the aircraft wants to fly direct from one significant point to another, and these points are not connected by an ATS route, insert DCT - direct.

The above two methods may be mixed.

All changes of either speed or Flight Level have to be clearly marked with the significant point at which these occur. If either speed or level changes, both speed and level have to be repeated exactly as laid down above, preceded by the significant point at which the change occurs followed by an oblique stroke (/).

Example: an aircraft flying from George to Bloemfontein, TAS 180 knots, at FL135 from George to VWV along Advisory Route W88D, then at FL155 from VWV to Bloemfontein along Airway W95 should be described as:

15 Cruising speed Kruisspoed	Level Vlak		Route Roete
– N0180	F135	→	W88D VWV / N0180 F155 W95

Note that the destination is not written in item 15, since it is stated in item 16.

A change of Flight Rules has to be clearly marked with the point at which this change occurs and the word 'VFR' if changing to VFR, or 'IFR' if changing to IFR.

Example: an aircraft flying from Durban to Richards Bay, via Eshowe, TAS 150 kts, IFR at FL130 along Airway B529 to Eshowe, then VFR at FL95 direct to Richards Bay should be described as:

15 Cruising speed Kruisspoed	Level Vlak		Route Roete
N0150	F130	→	B529 ES / N0150 F095 VFR DCT

Note that in the above example item 8 Flight Rules must be specified as Y (IFR first, then VFR).

Significant points shall be written in one of the following ways:

The code of the Navaid, *e.g.* SL (Sutherland NDB) or SLV (Sutherland VOR)

The code of the compulsory reporting point, *e.g.* ITBON = point on ATS route 87 on the FIR boundary between Cape Town and Port Elizabeth

Degrees only as 7 characters: Latitude in degrees (2 figures), followed by N or S, followed by degrees longitude (3 figures), followed by E or W, *e.g.* 26S028E

Degrees and minutes as 11 characters: Latitude in degrees and minutes (4 figures), followed by N or S, followed by longitude in degrees and minutes (5 figures), followed by E or W, *e.g.* 2610S02723E.

Bearing and distance from a Navigational aid, giving the Navaid as 2 or 3 characters, the magnetic bearing from it as 3 figures and the distance as 3 figures in nautical miles, *e.g.* HBV270040 means a point 40 nm 270 degrees from VOR HBV (Hartebeespoortdam).

Examples:

1. Flying from Durban (FADN) to Swartkops (FASK) at 190 kts, FL120 via New Hanover (NHV), Ladysmith (LYV) to Warden (WDV), then at FL110 to New Largo (NL), then at FL100 via Bronkhorstspruit (ME) to Swartkops.

15 Cruising speed Kruisspoed	Level Vlak	Route Roete
N0190	F120	→ NHV LYV WDV/N0190F110 NL/N0190F100 ME

2. Flying from Lüderitz to Eros at 420 kts, FL330, direct.

15 Cruising speed Kruisspoed	Level Vlak	Route Roete
– N0420	F330	→ DCT

3. A flight from Cape Town to London at airspeeds between 478 and 504 kts, step climbing from FL280 to FL390.

15 Cruising speed Kruisspoed	Level Vlak	Route Roete
– N0504	F280	→ DCT ENAKU DCT 3320S01740E 2851S01432E

2731S01339E/N0504F310 2128S01000E 2000S00909E 1801S00803E 1500S00625E
1418S00604E 1215S00500E/N0501F350 1000S00350E 0726S00232E 0500S00119E
0001S00109W DCT INAKA DCT AD UG851 BKY UG851D BKO/N0496F370 UR977F BULIS
UR977 ADM/N0478F350 UR724 SFI/N0482F390 UR724 VFA UR72 STG UR1 QPR UH111
ARE UG27 BARLU UB11 ELDER R84 HAZEL DCT OCK DCT

ENAKU, INAKA, BULIS etc. are significant points; AD, BKY, BKO etc. are navaids; UG851, UR977F, UR72 etc. are air-routes. (*Note:* Don't worry too much about it: when you get to fly that route, somebody else will complete the flight plan form for you.)

Item 16: DESTINATION AERODROME (4 characters)
Insert the ICAO four letter location indicator of the destination aerodrome.
Or insert
ZZZZ if no location indicator has been assigned (specify in item 18 under DEST/ the name of the destination airfield)

TOTAL ESTIMATED ELAPSED TIME (4 figures)
Insert the estimated time for the whole flight, from take-off to landing, in hours and minutes.

ALTERNATE AERODROME(S) (4 characters each)
Insert the ICAO location indicator(s) of the alternate aerodrome(s), that is airfield(s) you wish to proceed to if a landing at destination is not possible. This is only compulsory for IFR flights.
Or insert
ZZZZ if no location indicator has been assigned (specify in item 18 under ALTN/ the name of the alternate airfield(s)).

Example: a flight to Kimberley of a total duration of 2 hours and 10 minutes with Bloemfontein as an alternate aerodrome.

16 Destination aerodrome Bestemmingsvliegveld	Total eet Totale eet Hr. Min.	Altn. aerodrome Uitwykvliegveld
— FAKM	0210	→ FABL

Item 18: OTHER INFORMATION
Insert one or more of the following:

0 **if there is no other information.**

EET/ **Estimated elapsed time**
Compulsory only if one or more FIR boundaries are crossed during the flight. State accumulated EETs (from departure time) to FIR boundaries.
Example: EET/FAPE0140 EET/FADN0310, meaning, the FIR boundary to Port Elizabeth will be crossed 1 hour 40 minutes after off-block time, the boundary to the Durban FIR will be crossed 3 hours 10 minutes after off-block time.

REG/	Registration markings of the aircraft. Necessary only if different from the radio call sign as stated in item 7.
SEL/	Selcal code. Only if the Selective Calling System is used, see chapter 7.12.
OPR/	Name of operator. Only for charter or scheduled transport if this is not obvious from the aircraft radio call sign in item 7.
STS/	Reason for special handling by ATS. Only necessary if X or P was specified under Type of Flight (item 8), *e.g.* for hospital flights. *Example:* STS/HOSP.
TYP/	Type(s) of aircraft. Only necessary if ZZZZ has been specified in item 9. If necessary preceded by number of aircraft for each type.
PER/	Aircraft performance data. Only necessary if the type and its performance is not known to ATC, *e.g.* for homebuilt aircraft.
COM/	Data related to communications equipment. Only necessary if the communications equipment is non-standard. *Example:* an aircraft's radio only works on a specific frequency range, but arrangements have been made with ATC to fly it to a certain place for repairs.
NAV/	Data related to navigation equipment, if necessary.
DEP/	Departure aerodrome if ZZZZ was inserted in item 13. *Example:* taking off from a farm strip 25 nm southeast of Kimberley, insert: DEP/FARMSTRIP 25 NM SE FAKM.
DEST/	Destination aerodrome if ZZZZ was inserted in item 16. *Example:* DEST/MONTAGUE.
ALTN/	Alternate aerodrome if ZZZZ was inserted in item 16.
RMK/	Any plain language remark, if necessary. *Example:* RMK/STUDENT SOLO NAVEX (Navigation exercise by solo student).

ETD/	Estimated time of departure (?). This seems to be commonly used as date of departure if the Flight Plan is filed one or more days in advance.
SAR/	**Search and Rescue as requested by the pilot.** This is a compulsory group. See chapter 11 for details. Either SAR/NORMAL, SAR/NORMAL/EN ROUTE, SAR/place/time, SAR/place/time/EN ROUTE, or SAR/NIL.
SSR/	Data related to Secondary Surveillance Radar equipment.

Example: A flight for which Search and Rescue is requested if Jan Smuts is not notified by 18:00 hrs UTC, crossing into the Bloemfontein Flight Information Region 50 minutes after start and into the Johannesburg FIR 2 hours and 10 minutes after start.

18 Other information
Ander inligting

– SAR/FAJS 1800 EET/FABL 0050 EET/FAJS0210

Item 19: ENDURANCE (4 figures)

E/	**Insert the total fuel endurance in hours and minutes as a four-figure group.** The endurance is the time which the aircraft can stay airborne with the amount of fuel on board for this particular flight; it would be less than the total theoretical endurance if the tanks are not full at the beginning of the flight.

PERSONS ON BOARD (3 figures)

P/	**Insert the total number of people on board, passengers and crew.** Insert TBN (to be notified) if the total number of people is not yet known at the time of filing the flight plan.

EMERGENCY RADIO R/

U - UHF	**cross out if UHF frequency 243.0 MHz is not available.**
V - VHF	**cross out if a separate VHF radio with frequency 121.5 MHz is not available (do not cross out V if you carry a handheld)**
E - Elba	**cross out if an Emergency Locator Beacon Aircraft is not available.**

SURVIVAL EQUIPMENT

S	cross out S, P, D, M and J if no survival equipment is carried.
P	cross out P if polar survival equipment is not carried.
D	cross out D if desert survival equipment is not carried.
M	cross out M if maritime survival equipment is not carried.
J	cross out J if jungle survival equipment is not carried.

JACKETS

J	cross out J, L, F, U and V if no life jackets are carried.
L	cross out L if life jackets are not equipped with lights.
F	cross out F if life jackets are not equipped with fluorescein.
U	cross out U if life jackets are not equipped to transmit on UHF frequency 243.0 MHz.
V	cross out V if life jackets are not equipped to transmit on VHF frequency 121.5 MHz.

DINGHIES

D	cross out indicators D and C if no dinghies are carried.
Number	insert number of dinghies or insert nothing if no dinghies are carried.
Capacity	insert total capacity, i.e number of persons which can be carried in all dinghies combined or insert nothing if no dinghies are carried.
C	cross out C if dinghies have no covers or if no dinghies are carried.
Colour	insert nothing if no dinghies are carried or if dinghies have no covers, or insert colour of covers.

AIRCRAFT COLOUR AND MARKINGS

A	Insert colour of aircraft and any significant markings, *e.g.* white with blue and red stripes.

REMARKS (OTHER SURVIVAL EQUIPMENT)

N	cross out if there are no remarks, otherwise indicate any other survival equipment carried, *e.g.* First Aid Kit, Strips and Water.

PILOT-IN-COMMAND

C	Insert name and initial of pilot-in-command.

FILED BY	Insert the name of the person or agency filing the flight plan.

For an example of item 19 see sample flight plans in chapter 6.7.

6.6 FILING A FLIGHT PLAN IN FLIGHT

(Ref: ROA 3.27 - AIP RAC 1.2 - AIC 42.1)

If a flight plan is filed while the aircraft is in flight (only permissable if filing by telephone would have involved booking a trunk telephone call), it must comprise the following items, in the same format as laid down in chapter 6.5:

- Aircraft registration
- Flight rules
- Type of aircraft
- Aerodrome of departure
- Cruising speed and flight level
- Route to be followed and estimates as applicable
- Aerodrome of destination and estimated time of arrival
- Alternate aerodrome (for IFR flights)
- Alerting action required
- Fuel endurance (if alerting action was requested)
- Total number of persons on board.

6.7 SAMPLE FLIGHT PLANS

The following pages show three sample flight plans.

Sample Flight Plan 1: A flight from Cape Town to Port Elizabeth, VFR in a Cessna Cutlass ZS-KSS, which is equipped with VHF, VOR, ADF, ILS, DME and a 4-digit transponder without altitude encoding. Leaving Cape Town at 8 am local time, cruising speed 130 knots, Flight Level 95, routing via SP, GE, then along advisory routes. Total time en route is 2:35, of that 2 hrs to the FIR boundary (ITBON). The endurance is 4:30 hours, three people on board, no special equipment for survival is carried, except the legally required First Aid Kit and strips. The aircraft is white and blue, and the pilot is Joe Soap.

Sample Flight Plan 2: A flight from Rand Airport to Virginia near Durban, VFR in a Piper Warrior ZS-JGP, which is equipped with VHF, VOR and ADF. Leaving Rand at 12 noon, cruising speed 115 knots. Routing via Meyerton, then in a straight line to Virginia. Altitude 7000 feet to Meyerton, thereafter FL75. Total time en route is 2:40, time from Rand to the Durban FIR 1:05. The endurance is 5:00 hours, two people on board, no special equipment for survival is carried, except the legally required First Aid Kit and strips. The aircraft is white and blue, and the pilot is Ian Michael Andrew Flyer.

Sample Flight Plan 3: A non-scheduled flight by Icarus Charter from Durban to Port Elizabeth, IFR in a King Air 200 ZS-KLM, equipped with VHF, VOR, ADF, ILS, DME, Omega, a mode C transponder and a handheld VHF radio. Leaving Durban at 8 am local time, cruising speed 210 knots, Flight Level 200, routing along the airways. Total time en route is 1:55, 0:41 hrs to the FIR boundary. Alternate airfields East London and George. Endurance 4:50 hours, 2 pilots and 6 passengers on board, First Aid Kit, signal strips and water carried. The aircraft is white and tan, the pilot is J. Brown.

G.P.-S. 009-0239

SAMPLE FLIGHT PLAN 1

TV 2 120A

REPUBLIC OF SOUTH AFRICA

FLIGHT PLAN
VLUGPLAN

REPUBLIEK VAN SUID-AFRIKA

Priority / Prioriteit: <<≡ FF →
Addressee(s) / Geadresseerde(s): <<≡

Filing time / Tyd van indiening: →
Originator / Opsteller: <<≡

Specific identification of addressee(s) and or originator
Spesifieke identifikasies van geadresseerde(s) en of opsteller

3 Message type / Tipe boodskap: <<≡ (FPL
7 - Aircraft identification / Lugvaartuig identifikasie: – 2SKSS
8 Flight rules / Vliegreëls: – V
Type of flight / Tipe vlug: G <<≡

9 Number / Nommer: –
Type of aircraft / Tipe lugvaartuig: C172
Wake turbulence cat / Volgstroomklas: L
10 Equipment / Toerusting: – SD/A <<≡

13 Departure aerodrome / Vertrek vliegveld: – FACT
Time / Tyd: 0600 <<≡

15 Cruising speed / Kruisspoed: – N0130
Level / Vlak: F095
Route / Roete: → DCT SP DCT GE W87D HD DCT
<<≡

16 Destination aerodrome / Bestemmingsvliegveld: – FAPE
Total eet / Totale eet Hr. Min.: 0235
Altn. aerodrome / Uitwykvliegveld: → FAPZ
2nd altn. aerodrome / 2de uitwykvliegveld: → FAUH <<≡

18 Other information / Ander inligting: – EET/FAPE 0200 SAR/NORMAL
<<≡

Supplementary information (not to be transmitted in FPL messages)
Aanvullende inligting (moet nie in FPL boodskappe oorgesein word nie)

19 Endurance / Brandstofduur Hr. Min.: – E 04 30
Persons on board / Persone aan boord: → P 003
Emergency radio / Noodradio: → R UHF ☒ VHF ☒ Elba ☒

Survival equipment Oorlewingstoerusting: → ☒ Polar / Pool ☒ Desert / Woestyn ☒ Maritime / Maritieme ☒ Jungle / Oerwoud ☒
Jackets Reddingsbaadjies: → ☒ Light / Lig ☒ Fluores / Floures ☒ UHF ☒ VHF ☒

Dinghies/Reddingsboot: → ☒ Number / Nommer → Capacity / Vermoë → Cover / Oortreksel ☒ → Colour / Kleur <<≡

Aircraft colour and markings / Lugvaartuig kleur en merktekens
A / WHITE + BLUE

Remarks / Opmerkings
→ N / FAK + STRIPS <<≡

Pilot-in-command / Gesagvoerder
C / J. SOAP) <<≡

Filed by/Ingedien deur
PILOT

Space reserved for additional requirements
Spasie voorbehou vir addisionele besonderhede

G.P.-S. 009-0239

SAMPLE FLIGHT PLAN 2

TV 2/120A

REPUBLIC OF SOUTH AFRICA

FLIGHT PLAN
VLUGPLAN

REPUBLIEK VAN SUID-AFRIKA

Priority / Prioriteit: <<≡ FF ➤

Addressee(s) / Geadresseerde(s): <<≡

Filing time / Tyd van indiening: ➤

Originator / Opsteller: <<≡

Specific identification of addressee(s) and/or originator
Spesifieke identifikasies van geadresseerde(s) en/of opsteller

3 Message type / Tipe boodskap: <<≡ (FPL

7 Aircraft identification / Lugvaartuig identifikasie: — ZSJGP

8 Flight rules / Vliegreels: — V

Type of flight / Tipe vlug: G <<≡

9 Number / Nommer: —

Type of aircraft / Tipe lugvaartuig: PA28

Wake turbulence cat / Volgstroomklas: L

10 Equipment / Toerusting: — VOF/N <<≡

13 Departure aerodrome / Vertrek vliegveld: — FAGM

Time / Tyd: 1000 <<≡

15 Cruising speed / Kruisspoed: — N0115

Level / Vlak: A070 ➤

Route / Roete: DCT MT/N0115 F075 DCT <<≡

16 Destination aerodrome / Bestemmingsvliegveld: — FAVG

Total eet / Totale eet Hr. Min.: 0240

Altn aerodrome / Uitwykvliegveld: ➤

2nd altn. aerodrome / 2de uitwykvliegveld: ➤ <<≡

18 Other information / Ander inligting: — EET/FADN 0105 SAR/NORMAL <<≡

Supplementary information (not to be transmitted in FPL messages)
Aanvullende inligting (moet nie in FPL boodskappe oorgesein word nie)

19 Endurance / Brandstofduur Hr. Min.: — E/ 0500

Persons on board / Persone aan boord: ➤ P/ 002

Emergency radio / Noodradio: ➤ R/ UHF ☒ VHF ☒ Elba ☒

Survival equipment / Oorlewingstoerusting: ➤ ☒ Polar / Pool ☒ Desert / Woestyn ☒ Maritime / Maritieme ☒ Jungle / Oerwoud ☒

Jackets / Reddingsbaadjies: ➤ ☒ Light / Lig ☒ Fluores / Floures ☒ UHF ☒ VHF ☒

Dinghies / Reddingsboot: ➤ ☒ Number / Nommer: ➤ Capacity / Vermoe: ➤ Cover / Oortreksel ☒ ➤ Colour / Kleur: <<≡

Aircraft colour and markings / Lugvaartuig kleur en merktekens: A/ WHITE + BLUE

Remarks / Opmerkings: ➤ N/ FAK, STRIPS <<≡

Pilot-in-command / Gesagvoerder: C/ I.M.A. FLYER) <<≡

Filed by / Ingedien deur: PILOT

Space reserved for additional requirements
Spasie voorbehou vir addisionele besonderhede

G.P.-S. 009-0239

SAMPLE FLIGHT PLAN 3

TV 2 120A

REPUBLIC OF SOUTH AFRICA

FLIGHT PLAN
VLUGPLAN

REPUBLIEK VAN SUID-AFRIKA

Priority
Prioriteit
<<≡ FF →

Addressee(s)
Geadresseerde(s)
<<≡

Filing time
Tyd van indiening
→
Originator
Opsteller
<<≡

Specific identification of addressee(s) and or originator
Spesifieke identifikasies van geadresseerde(s) en of opsteller

3 Message type / Tipe boodskap: <<≡ (FPL

7 Aircraft identification / Lugvaartuig identifikasie: – ZSKLM

8 Flight rules / Vliegreëls: – I

Type of flight / Tipe vlug: N <<≡

9 Number / Nommer: –

Type of aircraft / Tipe lugvaartuig: BE20

Wake turbulence cat / Volgstroomklas: L

10 Equipment / Toerusting: – SDM/C <<≡

13 Departure aerodrome / Vertrek vliegveld: – FADN

Time / Tyd: 0600 <<≡

15 Cruising speed / Kruisspoed: – N0210

Level / Vlak: F200

Route / Roete: → W87 ASPIK UW87 ELV DCT PA DCT

<<≡

16 Destination aerodrome / Bestemmingsvliegveld: – FAPE

Total eet / Totale eet (Hr Min): 0155

Altn. aerodrome / Uitwykvliegveld: → FAEL

2nd altn. aerodrome / 2de uitwykvliegveld: → FAGG <<≡

18 Other information / Ander inligting: – EET/FAPE 0041 SAR/NORMAL OPR/ICARUS CHARTER

<<≡

Supplementary information (not to be transmitted in FPL messages)
Aanvullende inligting (moet nie in FPL boodskappe oorgesein word nie)

19 Endurance / Brandstofduur (Hr. Min.): – E 0450

Persons on board / Persone aan boord: → P 008

Emergency radio / Noodradio: → R UHF ☒ VHF V Elba ☒

Survival equipment Oorlewingstoerusting: → ☒ Polar / Pool ☒ Desert / Woestyn ☒ Maritime / Maritieme ☒ Jungle / Oerwoud ☒

Jackets Reddingsbaadjies: → ☒ Light / Lig ☒ Fluores / Floures ☒ UHF ☒ VHF ☒

Dinghies Reddingsboot: → ☒ Number / Nommer → Capacity / Vermoë → Cover / Oortreksel ☒ → Colour / Kleur <<≡

Aircraft colour and markings / Lugvaartuig kleur en merktekens: A WHITE + TAN

Remarks / Opmerkings: → N FAK, STRIPS, WATER <<≡

Pilot-in-command / Gesagvoerder: C J. BROWN) <<≡

Filed by Ingedien deur

A.B. Lewis

Space reserved for additional requirements
Spasie voorbehou vir addisionele benodighede

7. RADIO OPERATION

(Ref: AIC 41.3)

7.1 PHONETIC ALPHABET

(Ref: AIC 41.3)

When transmitting over the aircraft radio, all groups of letters, aircraft call signs, location indicators etc. have to be spelt out using the phonetic alphabet. Only letter groups which by everyday use have become unmistakeable, *e.g.* ILS, ETA, CTR etc. may be spoken in the normal way.

The phonetic alphabet given below must be learnt by heart before attempting to use the radio installation of an aircraft. In the pronunciation given the syllable in CAPITALS is to be emphasized.

A - Alpha - AL fah
B - Bravo - BRA voh
C - Charlie - CHAR lee
D - Delta - DELL tah
E - Echo - ECK oh
F - Foxtrot - FOKS trot
G - Golf - GOLF
H - Hotel - hoh TELL
I - India - IN dee ah
J - Juliet - JEW lee ett
K - Kilo - KEY loh
L - Lima - LEE mah
M - Mike - MIKE
N - November - no VEM ber
O - Oscar - OSS cah
P - Papa - PAH pah
Q - Quebec - keh BECK
R - Romeo - ROW me oh
S - Sierra - see AIRRAH
T - Tango - TANG go
U - Uniform - YOU nee form
V - Victor - VIK tah
W - Whiskey - WISS key
X - X-ray - ECKS ray
Y - Yankee - YANK key
Z - Zulu - ZOO loo

7.2 NUMERALS

(Ref: AIC 41.3)

All figures, *e.g.* Flight Levels, altitudes, time etc. are to be spoken digit by digit, but the word TOUSAND may be used for full thousands and the word HUNDRED for full hundreds.

0 - zero - ZE roh
1 - one - WUN
2 - two - TOO
3 - three - TREE
4 - four - FOW er
5 - five - FIFE
6 - six - SIX
7 - seven - SEV en
8 - eight - AIT
9 - nine - NIN er

The decimal point or comma is pronounced as DAY-see-mal.

Examples:

10 - wun zeroh
550 - fife fife zeroh
2000 - too tousand
3500 - tree tousand fife hundred
15 000 - wun fife tousand
119.7 - wun wun niner dayseemal seven

7.3 MORSE CODE

(Ref: AIC 41.3)

Morse code was originally used for all Radio Telegraphy. Today it has almost completely been replaced by voice communications in Radio Telephony (R/T). But navigational beacons like NDBs and VORs still send out their identifying letters by means of the morse code. Therefore, every pilot must be able to listen to the identification in Morse in order to decide whether or not his navigational radios are tuned to and receiving the correct station. Morse code does not have to be learnt by heart anymore, but candidates for the two radio licences must be able to identify a repeated three-letter morse code within a reasonably short time with the aid of the morse code table printed below.

Alpha	· –
Bravo	– · · ·
Charlie	– · – ·
Delta	– · ·
Echo	·
Foxtrot	· · – ·
Golf	– – ·
Hotel	· · · ·
India	· ·
Juliet	· – – –
Kilo	– · –
Lima	· – · ·
Mike	– –
November	– ·
Oscar	– – –
Papa	· – – ·
Quebec	– – · –
Romeo	· – ·
Sierra	· · ·
Tango	–
Uniform	· · –
Victor	· · · –
Whiskey	· – –
X-ray	– · · –
Yankee	– · – –
Zulu	– – · ·

7.4 TIME

(Ref: AIC 41.3)

To standardise the time used internationally and to avoid confusion between flights originating in different time zones, aviation exclusively uses UNIVERSAL CO-ORDINATE TIME (UTC, formerly Greenwich Mean Time GMT) and the 24-hour clock. Midnight is designated to be 0000 at the start of the day, 2400 at the end of the day.

Since the earth turns 360° in 24 hours, it will turn 15° per hour. The earth has been divided into 24 one-hour time zones from west to east, each comprising roughly 15° of longitude. Time zone A (Alpha) covers most of Europe, zone B (Bravo) comprises all of South Africa, to the east follows C (Charlie), until finally time zone Z (Zulu) is equal to UTC. This means Bravo time or South African Standard Time (SAST) is always two hours ahead of Zulu time or UTC. In other words, 10 am South African time is equal to 8am or 0800 UTC.

Examples:
10.30 am SAST = 1030 SAST = 0830 UTC
9.20 pm Bravo = 2120 Bravo = 1920 UTC
noon SAST = 1200 SAST = 1000 UTC
1.25 am SAST = 0125 SAST = 2325 UTC

Note that all times are spoken in individual digits, *e.g.* 1920 UTC is spoken "one niner two zero" over the R/T and 2000 UTC is "two zero zero zero".

If no confusion as to the hour is possible, minutes only may be transmitted, *e.g.* 0957 may be spoken as "zero niner five seven" or simply as "five seven" if it is clear that hour 09 is meant.

7.5 Q-CODES

(Ref: AIC 41.10)

Q-codes are relics from the days of Radio Telegraphy. They are three-letter groups, all starting with "Q", representing often used phrases and were invented to shorten communications. Today, with voice communications being the norm, most Q-codes are redundant. A few Q-codes have survived though, and still serve as "abbreviations" for often used information to make communications easier and shorter.

Example: to say "the QNH is 1023" is much more streamlined and shorter than to say "the present atmospheric pressure corrected for sea level is 1023".

QNH	Present atmospheric pressure at a place corrected for sea level. With QNH set in the subscale of the altimeter, it will read airfield elevation when on the ground, or ALTITUDE in flight. See also chapter 4.
QFE	Present atmospheric pressure at a place. With QFE set in the subscale of the altimeter, it will read zero when on the ground, or HEIGHT in flight. See also chapter 4.
QNE	What the altimeter reads when on the ground at a certain airfield with standard setting 1013.2 hPa set in the subscale of the altimeter. See also chapter 4.
QBI	It is compulsory to fly under IFR at a place. ATC may suspend all VFR traffic in a specific controlled airspace for a certain time for reasons **other** than weather; in other words: a specific airspace is temporarily declared class A. Reasons could be: amount of IFR traffic, emergency or urgency traffic, unexpected military operations, equipment failure, ATC incapacitation etc.

QTE	True bearing from the station.
QDM	Magnetic heading to reach the station.
QDR	Magnetic bearing from the station.
(QSY)	Change frequency to ... (no longer in existence, but still occasionally heard from older pilots)

The above Q-codes should be learnt and their meaning understood.

7.6 CALL SIGNS

(Ref: AIC 41.3)

The following call signs shall be used in Aeronautical Radio Telephony:

7.6.1 GROUND STATIONS

(Ref: AIC 41.3)

Aeronautical ground stations can have the following call signs:

AIRWAYS	Airways Control Centre preceded by the name of the centre, *e.g.* DURBAN AIRWAYS
APPROACH	Approach Control Office preceded by the name of the centre, *e.g.* CAPE TOWN APPROACH
CONTROL	Area Control Centre preceded by the name of the centre, *e.g.* UPINGTON CONTROL
INFORMATION	Flight Information Centre preceded by the name of the centre, *e.g.* BLOEMFONTEIN INFORMATION
RADAR	Surveillance Radar preceded by the name of the radar office, *e.g.* JAN SMUTS RADAR
RADIO	AFIS unit preceded by the name of the aerodrome, *e.g.* PORT ALFRED RADIO
TOWER	Aerodrome Control Office preceded by the name of the airfield, *e.g.* VORSTER TOWER
GROUND	Surface Movement Control preceded by the name of the airfield, *e.g.* MALAN GROUND

7.6.2 AIRCRAFT CALL SIGNS

(Ref: AIC 41.3)

Aircraft stations shall use one of the following call signs:

- The five character registration marking of the aircraft, *e.g.* ZS-ABC (Zulu Sierra Alpha Bravo Charlie). This may be abbreviated nationally to the last three characters, if no confusion can arise from it, *e.g.* ABC (Alpha Bravo Charlie), or to the first and last two characters internationally, *e.g.* ZBC.
- The type of aircraft followed by the registration markings, *e.g.* BONANZA ZS-ABC (Bonanza Zulu Sierra Alpha Bravo Charlie) or BONANZA ABC for short.
- The name of the operating agency plus the five character registration marking, *e.g.* SPRINGBOK ZS-SAB (Springbok Zulu Sierra Sierra Alpha Bravo), which may be abbreviated to SPRINGBOK SAB.
- The name of the operating agency plus the flight number, *e.g.* SPRINGBOK 234 (Springbok Two Three Four). No abbreviation possible.
- A code for military aircraft, *e.g.* NOVEMBER 08 JULIET.

A student pilot on a solo flight should prefix the call sign with the word STUDENT, *e.g.* "Student Alpha Bravo Charlie", at least on the first call to any one station.

7.7 LANGUAGES TO BE USED

(Ref: AIC 41.3)

Both official languages English and Afrikaans may be used in radiotelephony in South Africa. It is desirable though, that all pilots in the same airspace should be able to understand all communications. Since English is the international language for radio telephony communications, English should be used whenever there might be a pilot in the air who is not capable of understanding Afrikaans, *e.g.* the crew of a foreign airline.

In adjoining countries, *e.g.* Botswana, only English may be used in radiotelephony.

7.8 TEST PROCEDURES

(Ref: AIC 41.3)

When there is any doubt as to the proper operation of radio equipment, the following test procedures shall be used. The aircraft wanting to test its equipment shall say:

Identification of station called
Aircraft call sign
Either: "Signal check" (when in the air),
"Maintenance check" (routine ground testing) or
"Pre-flight check" (when about to depart)
The frequency.

The reply to this test procedure shall be:

Aircraft call sign
Identification of station calling
"Reading you"
The number according to the readability scale (see below).

The following readability scale shall be used:

1 unreadable
2 readable now and then
3 readable, but with difficulty
4 readable
5 perfectly readable

Example of a test transmission:

The aircraft calls:

"Malan Ground, Zulu Sierra Alpha Bravo Charlie, Preflight Check on one two one decimal niner".

With the reply:

"Alpha Bravo Charlie, Malan Ground, reading you five".

7.9 CATEGORIES OF MESSAGES

(Ref: AIC 41.3)

The following categories of messages are given in order of priority:

- Distress messages and distress traffic (prefix MAYDAY), see chapter 10
- Urgency messages (prefix PAN), see chapter 10
- Communications relating to Direction Finding (D/F), see chapter 16.1
- Flight Safety messages, that is messages from ATC to aircraft, position reports from aircraft (in other words, the "normal" radio messages)
- Meteorological messages
- Flight Regularity messages, that is communications between an aircraft operating agency (*e.g.* a charter company) to one of their aircraft or vice versa about changes in flight schedules, spare parts required etc.

7.10 SIGNALS TO AIR TRAFFIC

(Ref: ROA 3.33 - AIP AGA 0.4 - AIP RAC 1.8)

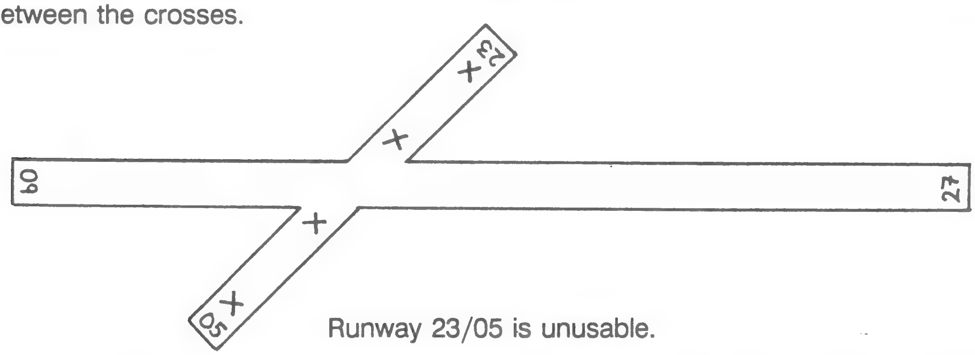
The following signals may be used for communication between ground and aircraft or between aircraft in flight.

7.10.1 GROUND SIGNALS

(Ref: ROA 3.33(3) - AIP GEN 3 - AIP AGA 0.4 - AIP RAC 1.8)

7.10.1.1 CLOSED RUNWAYS, TAXIWAYS, MANOEUVERING AREAS

By day, white crosses on runways or taxiways denote unsafe areas, *e.g.* waterlogged runways or areas undermined by moles etc. The crosses will be displayed at both ends of the unserviceable area, and aircraft may not land, take-off or taxi in the areas between the crosses.

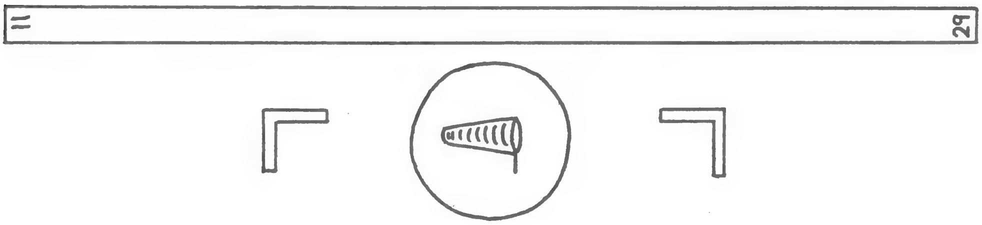


Runway 23/05 is unusable.

By night, these areas are marked with red lights. In addition, the runway or taxiway lights between the delimiting red lights will be extinguished.

7.10.1.2 TRAFFIC PATTERN INDICATORS

To show pilots whether a left or right hand circuit is to be flown, a pair of white L-markings may be used. These are placed around the windsock circle in such a way, that the one side of the "L" is aligned with the runway direction, while the other side of the "L" shows the direction in which the circuit must be flown.



Runway 11: right-hand circuit, runway 29: left-hand circuit.

7.10.2 LIGHT SIGNALS

(Ref: ROA 3.33)

In case of radio failure the following light signals may be used to aircraft in or around an airfield in flight or on the ground.

7.10.2.1 TO AIRCRAFT IN FLIGHT

Steady green:	Cleared to land.
Steady red:	Give way to other aircraft and continue circling. A further signal will follow in due course.
Series of green flashes:	Return for landing. Will be followed by a steady green light in due course.
Series of red flashes:	Aerodrome unsafe, do not land.
Red flare:	Do not land for the time being, await further instructions.

These light signals are still valid and part of the Rules of the Air, and therefore must be learned. However, they are hardly used any more and pilots must be acquainted with the radio failure procedures to be followed as specified in chapter 9.

7.10.2.2 TO AIRCRAFT ON THE GROUND

Steady green:	Cleared for take-off.
Steady red:	Stop.
Series of green flashes:	Taxi.
Series of red flashes:	Clear the runway.
Flashing white light:	Return to the starting area.

These light signals will not be used in the case of a sudden radio failure at a controlled aerodrome. If the aircraft radio fails while taxying out for take-off, the aircraft must return to the starting point.

7.10.3 INTERCEPTION SIGNALS

(Ref: AIP GEN 3 - ROA 10.6)

It may sometimes be necessary to investigate the identity of an aircraft (*e.g.* one which may have strayed into foreign airspace), to lead an aircraft away from a prohibited area, or to make an aircraft land at a specific airfield.

In these cases it will be intercepted. The intercepted aircraft should try to establish communications with the interceptor on the international distress frequency 121.5 MHz. Should it not be possible to establish communications, the visual signals set out in the table below will be used. If the intercepted aircraft is in distress, the distress signals mentioned in chapter 7.10.4 should be used.

Signal by Interceptor	Meaning	Response by intercepted aircraft
FIRST SERIES:	used to guide an aircraft away from a prohibited area or to a landing field	
a) rocking wings while in front and to left of intercepted aircraft; at night in addition flashing navigational and landing lights at irregular intervals	Follow me away from a prohibited area	Rocking wings if safe, at night also showing steady landing light
b) rocking wings while in front and to right of intercepted aircraft; at night in addition flashing navigational and landing lights at irregular intervals	Follow me to a landing terrain	Rocking wings if safe, at night also showing steady landing light
c) after a) or b) have been acknowledged, making a slow level turn onto desired course; at night in addition flashing navigational and landing lights at irregular intervals		Follow interceptor
SECOND SERIES	used for identifying aircraft and after having led an aircraft away from a prohibited area with the first series	
An abrupt break away upwards of 90° or more without crossing the line of flight of the intercepted aircraft	You may proceed	Rocking wings if safe, at night also showing steady landing light
THIRD SERIES	used after the first series in the vicinity of the landing area	
Circling landing area, lowering landing gear, overflying in landing direction, at night also showing steady landing light	Land on this area	Same as interceptor. Land if safe, at night also steady landing light

Signal by intercepted aircraft	Meaning	Response by interceptor
FOURTH SERIES	used if the intercepted aircraft finds the proposed landing area unsuitable	
Rocking wings (if fixed gear) or raising landing gear while passing over landing area between 1000 and 2000' AGL, at night also flashing landing light or any other available light	Landing area unsuitable	continues with first (follow me) or second series (you may proceed)

A copy of the above interception signals must, by law, be carried on every flight.

7.10.4 DISTRESS SIGNALS

(Ref: AIP GEN 3)

The following signals shall be used, when an aircraft is in grave and imminent danger and in need of immediate assistance:

- SOS in Morse code (• • • / – – – / • • •)
- the word MAYDAY (see also chapter 10)
- rockets or shells throwing red lights, fired one at a time at short intervals
- a parachute flare showing a red light

7.11 SELECTIVE CALLING SYSTEM (SELCAL)

(General Licence only)

On long flights over quiet areas, *e.g.* on ocean crossings at night, it can be very tiresome for pilots to listen out on a frequency with a lot of radio chatter mainly meant for other traffic. In these instances the Selective Calling System (SELCAL) may be used, provided the ground station has no objections and is capable of transmitting SELCAL codes.

With a SELCAL receiver installed in the aircraft, the pilots do not have to keep a listening watch. Should ATC want to talk to the aircraft, the controller will transmit a group of two coded tone pulses. The decoder in the aircraft for which the message is meant will accept the signal and activate the cockpit call system by flashing a light or sounding a bell.

8. PRACTICAL COMMUNICATIONS

(Ref: AIC 41.2 - AIC 41.3 - NOTAM A058/92 - ICAO DOC 4444 partIX)

8.1 GENERAL CONSIDERATIONS

When speaking over the aircraft radio, a few general points should be considered:

- Make sure you have selected the correct frequency, turned the volume control up sufficiently and set the squelch (if fitted).
- Make sure the radio is switched "on" and the audio panel switches (if fitted) are correctly set to speaker or headphones. Also make sure that the transmit switch (if fitted) is set to the correct radio.
- Prepare your message before you start speaking. For longer messages, such as AIREPs, you might want to write the message out before commencing to talk.
- Anticipate the reply. If you expect detailed instructions or numbers, such as QNH, runway in use, another frequency etc., have pen and paper ready and write it down as you receive it. This will make the following read-back much easier.
- Listen out for at least ten seconds before pressing the microphone button, so that you do not interrupt other stations.
- Make sure you are holding the microphone the right way around, then press the mike button firmly. Do not release the mike button before you have finished talking.
- Hold the microphone close to your mouth at an even distance.
- Speak in a normal conversational tone, not too fast, not too slowly.
- Pronounce words clearly and distinctly.
- Use standard phraseology as much as possible. Try to put yourself into the controller's place, it will make it much easier to work out what information he needs from you. Don't be verbose.
- Make sure you have understood clearly what the controller requires. Don't be afraid to say "say again" if you have not understood the message clearly. If you did get some, but not all of it, specify what it is you did not understand, *e.g.* "say again the QNH" rather than making the controller repeat the whole message.
- After having made a mistake, don't give lengthy apologies, simply say "correction" and transmit the correct version.
- When asked something which you can't answer immediately, *e.g.* an estimate for the next reporting point, don't hum and haw; ask the controller to "stand by", work out your answer, then call him back.
- If you don't receive an immediate reply, wait at least 20 seconds before calling again; the controller may be busy on the telephone, the intercom or another frequency.
- Pre-plan your flight as far as radio procedures are concerned and give the controller as early warning as possible of your intentions. Especially when training, let the controller know on downwind already (instead of on final) that the next landing will be a full stop. When doing practice instrument approaches, let him know when initially requesting clearance for the approach that you plan to do a missed approach followed by radar vectors onto the ILS or that you want to land

off that approach or whatever the case may be. It helps in traffic planning and will make the controller more amenable to all your further training requests.

Example 1: when requesting taxi and you plan to do an intersection take-off or want to use the secondary runway voice your request in the first transmission rather than halfway down the taxiway as an afterthought. "George, Lima India Papa requests taxi to runway 20, if available, for a VFR flight to Mosselbay".

Example 2 (General licence only): You are approaching your destination on an IFR flight and have listened to the ATIS, which promises fine weather. You plan on a visual approach, but cannot legally request one yet since you are still in IMC. Let the controller know NOW with the words "We will be requesting a visual approach". This has to be followed in due course by "Request a visual approach". The procedure outlined above will give the controller ample warning to plan his traffic and you do not spring your visual approach on him at the last minute, overturning all his planning of how to get you onto the ILS.

8.2 ESTABLISHING CONTACT

(Ref: AIC 41.3)

When transmitting **for the first time during any one flight**, establish contact by calling the station addressed, giving your full call sign as well as the frequency used, *e.g.*: "Malan Ground, Zulu Sierra Alpha Bravo Charlie on one two one decimal niner". The reply will be: "Alpha Bravo Charlie, Malan Ground, transmit". The frequency should be stated only on initial contact and also when there might be confusion as to which frequency you are calling on. This could happen if you don't get contact on the primary frequency and then transmit on a secondary frequency. The controller of that secondary frequency would not be expecting your call, and since he might be monitoring more than one frequency it would help if you stated the frequency.

After a lengthy pause in communications, or when calling a new station, to which you have been transferred, establish contact by calling the station addressed, giving your call sign, but not the frequency, *e.g.*: "Bloemfontein Approach, Alpha Bravo Charlie". The reply will be "Alpha Bravo Charlie, Bloemfontein Approach". - Note that it is not necessary to state the frequency when establishing contact with a station to which you have been transferred. The controller from the previous frequency, who transferred you, will have alerted the controller of the new frequency, so he will be aware of you and waiting for your call.

If only a short time has elapsed between your last and the next call, *e.g.* between downwind leg and final approach, or if it is guaranteed that the station called will receive your call, it is not necessary to establish contact at all. In that case, you may go straight ahead with your message, *e.g.* "Alpha Bravo Charlie final one niner".

8.3 ACKNOWLEDGEMENT OF RECEIPT

(Ref: AIC 41.3)

All **instructions** (runway in use, altitudes or flight levels, speeds), all five possible **clearances** (take-off clearance, after departure clearance, clearance for the approach, landing clearance and clearance to cross an airway) and the **QNH** must be read back, that means they must be repeated exactly as received.

Pure information, *e.g.* the wind direction and speed, does not have to be read back. If that information is given on its own, without other instructions requiring read-back, it should be acknowledged by giving the aircraft call-sign.

Traffic information should be acknowledged by saying either "looking out" or "traffic in sight", as the case may be. This way the controller is satisfied that you have received the message about possible conflicting traffic.
Example:
(at the holding point):
Aircraft: "Verwoerd Tower, Alpha Bravo Charlie ready".
Tower: "Alpha Bravo Charlie, wind 090/15, cleared take-off, report left downwind, traffic is a Cessna 152 joining left downwind".
Aircraft: "Alpha Bravo Charlie cleared take-off, report left downwind, looking out".
(the wind is information which does not require repeating, the Cessna is acknowledged by 'looking out', the take-off clearance and the next reporting point are instructions and are to be read back).

(on downwind):
Aircraft: "Alpha Bravo Charlie left downwind 08".
Tower: "Alpha Bravo Charlie, number one to final".
Aircraft: "Number one to final, Alpha Bravo Charlie".
(the next reporting point is an instruction and must therefore be read back).

(on final):
Aircraft: "Alpha Bravo Charlie final, touch and go".
Tower: "Alpha Bravo Charlie, cleared touch and go".
Aircraft: "Cleared touch and go, Alpha Bravo Charlie".
(landing or touch-and-go clearance requires read-back).
Tower: "Alpha Bravo Charlie, wind 095/20".
Aircraft: "Alpha Bravo Charlie".
(acknowledge information about the wind by saying the aircraft call sign).

Broadcasts by an ATSU, *e.g.* a new QNH must be acknowledged by every aircraft (but don't all talk at once).
Example:
Tower: "Malan broadcast: QNH 1025".
A/c 1: "QNH 1025, Alpha Bravo Charlie".
A/c 2: "QNH 1025, Bravo Charlie Victor".

8.4 TRANSFER OF CONTROL

When a controller wishes an aircraft to contact another Air Traffic Services Unit (ATSU) he will issue an instruction giving the name of the new station and its frequency and the time or point at which he wants the transfer to take place. This can either be immediately or at some specific point later in the flight.

Aircraft may not change frequency without being instructed to do so, unless permission is obtained from the present controller.

Example 1:

APP: "Alpha Bravo Charlie, contact Botha Tower on 118.7"
means the aircraft must change frequency and establish communications immediately after the readback.

A/c: *reading back:* "Botha Tower on 118.7, Alpha Bravo Charlie".
The pilot will now change frequency to 118.7, listen out, and say:

A/c: "Botha Tower, Alpha Bravo Charlie"...

Example 2:

TWR: "Alpha Bravo Charlie cleared take-off, left turn out, contact Durban Approach on 119.1 passing Amanzimtoti"
means the aircraft is to change frequency only when passing Amanzimtoti.

A/c: *reading back:* "Cleared take-off, left out, contact Approach 119.1 passing Amanzimtoti".
Now the aircraft will take off, turn left, and when it is passing Amanzimtoti, will change frequency to 119.1, listen out, then say:

A/c: "Durban Approach, Alpha Bravo Charlie"...

8.5 REPORTING POINTS

A reporting point may be:

- a geographical point, *e.g.* "report HBV"
- a Flight Level or altitude, *e.g.* "report passing Level 150"
- a time, *e.g.* "report at 20"

Compulsory reporting points are geographical points marked on charts with solid triangles. They can be co-located with navigational aids, *e.g.* NDBs or VORs, and take their name from the Nav-aid, *e.g.* JF (Jagersfontein). They can also be at points where an air-route crosses an FIR boundary, in which case they have usually been allocated a five-letter identifier, *e.g.* GABGO or KODES.

Non-compulsory reporting points are marked with the outline of a triangle. ATC will advise whether or not they wish the pilot to report at these points.

ATC may also ask a pilot to report at any other place, Flight Level or altitude or time.

8.6 THE AIREP

The AIREP must be used for all reports to an ATSU while on a cross-country flight in controlled airspace. It is also used for all reports to an ATSU when flying in uncontrolled airspace, and it is used, in slightly modified form, for traffic broadcasts in uncontrolled airspace below 1500' AGL and when out of range of an ATSU.

Please note that it is important to know whether you are flying in controlled airspace, when your flight will be controlled, instructions from ATC have to be followed and you will be separated from other traffic by ATC - or whether you are flying in uncontrolled airspace, in which case you will receive traffic information only, cannot be "cleared" and will not be separated from other traffic. In both cases the actual communication between you and the ATSU will be almost identical, but the legal implications are indeed very different.

Section 1 (Position report) of the AIREP is compulsory at each significant point. In addition, section 2 (Operating data) should be used when necessary, *e.g.* when no Flight Plan has been filed and when first contacting the ATSU at the destination airfield. Section 3 (Meteorological data) is optional.
(Section 3 is not required for the Restricted Licence).

	Format	*Example*
Section 1:	Station called	Cape Town Area
	Identification	Juliet Golf Papa
	Position	Golf Echo
	Time	one zero two five
	Flight Level/Altitude	Flight Level eight five
	Next position and time	estimate Sierra Papa at four one
Section 2:	Destination and ETA	Estimate Cape Town at four nine
	Endurance	Endurance zero two three zero
Section 3:	Air Temperature	Temperature zero three
	Mean wind	Wind three zero zero at two three knots
	Turbulence	Moderate turbulence
	Aircraft icing	No icing
	Any other	Thunderstorms approx. 30 nm north of GE

The AIREP should always be given as completely as possible, even during climb and descent. *Example:* "Cape Town Approach, Kilo Sierra Sierra passing two tousand feet, estimate Sierra Papa at four zero" - *or:* "Kimberley, Alpha Bravo Charlie, top of descent, estimate Kimberley at three five".

8.7 EN-ROUTE REPORTS

(Ref: NOTAM A058/92)

8.7.1 IN CONTROLLED AIRSPACE

When flying in controlled airspace the pilot will be in radio contact with an Air Traffic Controller. The pilot has to report at all compulsory reporting points, even when not specifically asked by ATC to do so. He will report at non-compulsory reporting points or any other points when asked to do so by ATC (see chapter 8.5).

The pilot's reports are to be made in the form of the AIREP as detailed in chapter 8.6.

Example: an aircraft flying from Cape Town to Bloemfontein at FL150 is in the Cape Town UTA at Sutherland (SLV VOR). At SLV the pilot will report to 'Cape Town Control' on frequency 126.5:

A/c: "Cape Town, MIT"
C.T.: "MIT, Cape Town"
A/c: "MIT at SLV 1045, FL150, estimate VWV 1110"
C.T.: "Report VWV".

8.7.2 IN UNCONTROLLED AIRSPACE

(Ref: NOTAM A058/92)

8.7.2.1 ABOVE 1500' AGL

When flying in uncontrolled airspace above 1500 feet AGL the pilot should communicate with the appropriate ATSU on the "Information" frequency (see Appendix III). The communication will take essentially the same format as in controlled airspace (i.e. the AIREP), and ATSU will pass on any relevant information about conflicting traffic, if known, as well as any other pertinent information, but will not control the flight.

Example: an aircraft flying from Cape Town to Bloemfontein at FL95 is in uncontrolled airspace at Sutherland (SLV). At SLV the pilot will report to 'Cape Town Information' on frequency 125.1:

A/c: "Cape Town Information, EOA"
C.T.: "EOA, Cape Town"
A/c: "EOA at SLV 1045, FL95, estimate VWV 1130"
C.T.: "No reported traffic at FL95, report VWV".

In certain remote areas of South Africa it will not always be possible to be in two-way contact with an ATSU, even when above 1500' AGL. In these cases the pilot should make broadcasts on the Information frequency. This can lead to interference with other aircraft on the same frequency: a relatively low flying aircraft out of range might broadcast his position at the same time as the ATSU is talking to a higher flying or closer aircraft, the latter might receive both transmissions and is therefore not able to understand either. For this reason broadcasts on the Information frequency should be kept as short and to the point as possible. Again, they follow the format of the AIREP.

8.7.2.2 AT OR BELOW 1500' AGL

In uncontrolled airspace at or below 1500' AGL, but outside the lateral limits of:
- The Johannesburg Special Rules Area,
- The area below the Port Elizabeth TMA,
- The area below the East London TMA,
- The area below the Hoedspruit TMA, and
- All promulgated General Flying Areas

pilots should keep a listening watch and make regular broadcasts on frequency **124.8**. These 'Traffic Information Broadcast by Aircraft' (TIBA) take roughly the same form as the AIREP, but should be prefixed by the traffic addressed, the type of aircraft and the route. These broadcasts are for the benefit of other aircraft flying in the vicinity, and the pilots of these other aircraft obviously have no knowledge of the information that a controller would have from a Flight Plan or from previous communications.

Example 'normal' uncontrolled airspace below 1500' AGL: an aircraft flying from George to Port Elizabeth along the coast at 1000' AGL is in uncontrolled airspace at Plettenberg Bay. There the pilot will broadcast on frequency 124.8:

A/c: "Traffic in the Plettenberg Bay Area, Piper Arrow Lima Alpha Golf is on a flight from George to Port Elizabeth. Plettenberg Bay at 1045, 1000' AGL, estimate ITBON at 1105".

In all General Flying Areas the TIBA frequency to use is **124.4**. Traffic traversing the area on a normal cross-country flight should make a similar broadcast to the example above. Pilots on a training exercise in the GFA should state their approximate position, altitude and exercise.

Example training flight:

A/c: Traffic in the Johannesburg GFA, Beech Sundowner India Tango Foxtrot is 5 miles west of Venterspos, 7000 feet on QNH 1028, practising precautionary landings".

For the other exceptions listed above see chapter 12 (Special Areas).

8.8 CIRCUIT REPORTS

8.8.1 AT CONTROLLED AIRFIELDS

At a controlled airfield reports should be made when requested by the controller. This will usually comprise: on leaving the request for taxi, request for departure plus other reports as instructed - and on arriving the request for joining, downwind report, report on final plus other reports as instructed.

Depending on the airfield, one or several frequencies may be used for communication on and around the airfield. Smaller airfields will only have a Tower frequency, on which taxi and circuit instructions are given and clearances are transmitted. Busier airports may have a separate Surface Movement Control frequency for controlling taxying traffic, a Clearance Delivery frequency for transmitting clearances to departing traffic, and an Apron Office frequency for allocating parking bays to arriving aircraft.

Example 1 (departing a smaller airfield with Tower only):
A/c: "George, Zulu Sierra Juliet Golf Papa on 118.9"
TWR: "Juliet Golf Papa, George, transmit"
A/c: "Juliet Golf Papa, VFR to East London as per flight plan, three on board, request taxi"
TWR: "Juliet Golf Papa, taxi holding point runway 29, QNH 1021"
A/c: "Taxi 29, 1021, Juliet Golf Papa"

A/c: "George, Juliet Golf Papa ready"
TWR: "Juliet Golf Papa is cleared take-off, left turn out, report at Knysna"
A/c: "Cleared take-off, left out, report passing Knysna".

Example 2 (arriving at a larger airfield with TWR and SMC):
A/c: "Smuts Tower, Alpha Bravo Charlie left downwind for 03 Left"
TWR: "Alpha Bravo Charlie, number two to final 03 Left, follow a Boeing 737 on a two mile final"
A/c: "Number two to final to follow a Boeing 737, Alpha Bravo Charlie"

A/c: "Alpha Bravo Charlie final 03 Left"
TWR: "Alpha Bravo Charlie is cleared to land, wind 040/10"
A/c: "Cleared to land, Alpha Bravo Charlie"
TWR: "Alpha Bravo Charlie, first left, contact Ground 121.9 runway vacated"
A/c: "First left, Ground 121.9 vacated, Alpha Bravo Charlie"

A/c: "Smuts Ground, Alpha Bravo Charlie, vacated at Lima"
GND: "Alpha Bravo Charlie, taxi to Apron Bravo, expedite"
A/c: "To Apron Bravo, expedite, Alpha Bravo Charlie"

8.8.2 AT UNCONTROLLED AIRFIELDS

(Ref: NOTAM A058/92)

When landing or taking off at an uncontrolled airfield, pilots must broadcast their position and intentions on the applicable frequency.

Some airfields have been allocated specific frequencies, listed in Appendix I. At airfields situated within General Flying Areas frequency **124.4** must be used, at all other airfields the appropriate frequency is **124.8**.

In VMC the following procedures should be adopted:
When approaching an uncontrolled airfield to land, the pilot must tune in and listen out on the appropriate frequency when 5 nm from the field. He should then broadcast his position, level/altitude and intentions. This must be followed by transmissions overhead the field, on downwind, base and final. When taking off, the pilot should tune in and listen out before broadcasting his position on the airfield and his intentions. This must be followed with transmissions before taxying onto the runway for take-off and when clearing the circuit. Any message from other aircraft should be acknowledged.

Example: "Klerksdorp Traffic, Warrior Zulu Sierra Juliet Golf Papa, 5 miles west of the field at 6500 feet to join overhead" - "Klerksdorp Traffic, Juliet Golf Papa overhead at 6500 feet, will be joining left downwind runway 18" - "Klerksdorp Traffic, Juliet Golf Papa left downwind runway 18" - "Klerksdorp Traffic, Juliet Golf Papa left base runway 18" - "Klerksdorp Traffic, Juliet Golf Papa final runway 18" - "Klerksdorp Traffic, Juliet Golf Papa vacating runway 18".
and: "Klerksdorp Traffic, Piper Warrior Zulu Sierra Juliet Golf Papa in the parking area, taxying to the holding point runway 18" - "Klerksdorp Traffic, Juliet Golf Papa entering runway 18 for take-off for a flight to Lanseria" - "Klerksdorp Traffic, Juliet Golf Papa is clearing the circuit on a flight to Lanseria".

In IMC, when landing at an unmanned airfield with a published cloudbreak procedure, pilots must broadcast their intentions on the appropriate airfield frequency overhead the facility, before commencing the approach, when the inbound turn is completed, and commencing the missed approach if applicable. *(Last paragraph applicable to the General licence only).*

8.9 PHRASEOLOGY

(Ref: ICAO DOC 444 part IX - AIC 41.2 - AIC 41.3)

8.9.1 STANDARD WORDS

Whenever possible the standard words and phrases given below should be used. This makes communications easier, tries to prevent misunderstandings and keeps talk over the R/T short and precise .

Acknowledge	Let me know that you have received and understood this message; in other words, repeat this message back to me
Affirm	Yes
Approved	Permission is granted
Break	I hereby indicate the separation between different portions of the message
Break Break	I hereby indicate the separation between messages to different aircraft
Cancel	Invalidates the previously transmitted clearance
Check	Examine a system or procedure (normally no answer required)

Cleared	You are authorized to proceed with...
Confirm	Have I correctly received... *or* Did you correctly receive...
Contact	Change frequency and establish contact with...
Correct	That is correct
Correction	I made an error. The correct version is...
Disregard	Consider that transmission as not sent
Expedite	Hurry up
How do you read	How readable (understandable) is my transmission
I say again	I repeat for clarity or emphasis
Monitor	Listen out on frequency...
Negative	No *or* that is not correct *or* permission not granted
Read back	Repeat all or a specified part of my message back to me exactly as you received it
Recleared	Your last clearance has changed and is superseded by this new clearance
Report	Pass me the following information...
Request	I ask permission *or* I would like to know
Say again	Repeat all or a specified part of your last transmission
Speak slower	Speak slower, I have difficulty understanding
Stand by	Wait, I will call you back
Transmit	Proceed with your message
Verify	Check and confirm with the originator of the message that it was correct
Wilco	I understand your message and **will co**mply with it (not to be used if the message requires reading back)
Words twice	Since communications are difficult I will send every word or group of words twice *or* please send every word or group of words twice

The words 'Over', 'Out' and 'Roger' are not used any more due to the generally good reception in modern VHF communications.

Examples of how to use the standard words and phrases and in which context to use them, are given in the following chapters.

8.9.2 PHRASEOLOGY USED BY PILOTS

The following are standard phraseologies and should be used whenever possible. Only the phraseologies used by pilots when initiating a call are given, all other communications used should be read back exactly as received and are covered on the next few pages. Aircraft and ground station call signs have been omitted from these samples, but must, of course, be included in the actual message. Words in round parentheses ( ) indicate that specific information must be inserted to complete the phrase. Words in square parentheses [ ] indicate optional additional information.

to request a time check
    REQUEST TIME CHECK

to request aerodrome data, if there is no ATIS available
    REQUEST DEPARTURE INFORMATION

when unable to comply with an instruction
    UNABLE TO COMPLY

when pilot wishes to change to another frequency
    REQUEST CHANGE TO (frequency)

to request taxi to a point on the airfield
    [aircraft location] REQUEST TAXI TO (destination on aerodrome)
        Example: "Botha Tower, Alpha Bravo Charlie at the hangars, request taxi to the fuel pumps"

to taxi for departure
    [aircraft type] [wake turbulence category] [aircraft location] REQUEST TAXI [intentions]
        Example: "Malan Ground, Tomahawk Kilo Kilo Charlie Light at Good Hope Flying Club, request taxi for circuits"
or [aircraft type] [wake turbulence category] [aircraft location] (flight rules) TO (aerodrome of destination) REQUEST TAXI [intentions]
        Example: "Virginia Tower, Cessna Cardinal Zulu Sierra Mike Oscar Golf Light, on the apron, VFR to Hibberdene, request taxi"

to request crossing a runway
    REQUEST CROSS RUNWAY (number)

when ready for departure
    READY

to request descent
    REQUEST DESCENT AT (time)

to request a visual descent
    REQUEST VMC DESCENT

to request a visual or straight-in approach
    REQUEST VISUAL APPROACH
    REQUEST STRAIGHT-IN APPROACH

first transmission to TOWER for landing
    [aircraft type] (position) (level) FOR LANDING
        Example: "Malan Tower, Bravo Charlie Delta, Zeekoevlei at 1500 feet for landing"

reporting position in the circuit
(position in the circuit, *e.g.* DOWNWIND/FINAL)
Example: "Alpha Bravo Charlie downwind"

when vacating the runway
RUNWAY VACATED

8.9.3 PHRASEOLOGY USED BY CONTROLLERS

The following are sample phraseologies used by air traffic controllers. The list does not claim to be exhaustive, and individual controllers may use slightly differing phrases, but the phrases listed below should give an indication of what a pilot can expect. As stated before, pilots should read back all instructions, clearances and the QNH exactly as received. *(The parts of this paragraph referring to IFR are for the General Licence only).* Refer also to standard words given in paragraph 8.9.1.

... WHEN READY
take action when you are ready for it
Example: "VMC descent when ready"

... APPROVED
you may do what you requested
Example: "4000 feet approved above the General Flying Area"

HOLD POSITION
stay where you are

HOLD SHORT OF (position)
stop before reaching ...
Example: "Hold short of the apron"

BACKTRACK RUNWAY (number)
enter and proceed along the runway against the take-off and landing direction

FOLLOW (description of aircraft)
Example: "Follow the 737 to the holding point"

REPORT WHEN READY [FOR DEPARTURE]

ARE YOU READY FOR IMMEDIATE DEPARTURE?
Note: If you answer "affirm", get going immediately. If you are not quite ready, answer "negative". ATC will ask you this question to do you a favour and get you off, don't mess things up by answering "affirm" if you can't comply

BEHIND (aircraft) LINE UP BEHIND
Example: "Behind the landing Falcon line up behind"

LINE UP AND WAIT
taxi onto the runway and stop there

CLEARED FOR TAKE-OFF

WIND (number) DEGREES (number) KNOTS
Example: "Wind 210 degrees 15 knots"

CLIMB [or DESCEND] TO (level) TO REACH (level) BY (point) AT (number) FEET PER MINUTE [MINIMUM or MAXIMUM]
Example: "Climb to FL120, to reach 6000 feet by 10 DME"

CROSS (reporting point) AT (altitude) [OR ABOVE/BELOW]
Example: "Cross CT at 3000 feet or above"

REPORT LEAVING [or REACHING or PASSING] (level)
Example: "Report passing FL85"

CONTINUE CLIMB [or DESCENT] TO (level)
Example: "Continue descent to FL55"

MAINTAIN (level)
Example: "Maintain 1500 feet"

MAINTAIN OWN SEPARATION
ATC will not separate you from other traffic

MAINTAIN VMC
stay in Visual Meteorological Conditions

NEXT REPORT AT (point)
Example: "Next report at SLV"

REPORT PASSING (point)
Example: "Report passing 2000 feet"

REPORT RUNWAY IN SIGHT

TRAFFIC IS (information)
Example: "Traffic is a Cessna 210 joining left base"

NO REPORTED TRAFFIC
the controller does not know of any aircraft on a possible collision course with you (that does not necessarily mean there is no other traffic)

(aircraft) CLEARED TO (details)
Example: "ABC cleared Cape Town to George, FL330, flight plan route"

RECLEARED (amended clearance details)
Example: "Recleared FL210"

(aircraft) RADAR IDENTIFIED
I know who you are on my radar screen

(aircraft) UNDER RADAR CONTROL
You will be provided with radar control service

RADAR CONTROL TERMINATES
You are no longer provided with radar control service

CLEARED (type of approach) APPROACH [RUNWAY (number)]
Example: "Cleared ILS approach runway 19"
Note: the clearance limit of an approach is the end of the missed approach procedure. That is, when cleared for the approach and having to execute a missed approach, you may return to the facility at initial approach altitude without obtaining a further clearance.

CONTACT (unit call sign) (frequency) (condition)
Example: "Contact Cape Town Approach 119.7 passing 2000 feet"

MONITOR (unit call sign) (frequency)
change frequency and listen out
Example: "Monitor Approach 119.7"

REMAIN THIS FREQUENCY
continue monitoring this frequency

SQUAWK (SSR code)
dial given code into transponder and switch it on

COMMENCE APPROACH AT (time)

CLEARED STRAIGHT-IN APPROACH [RUNWAY (number)]

ENTER CONTROLLED AIRSPACE AT (level and/or time or point)
Example: "Enter controlled airspace FL65"

TURN RIGHT [or LEFT] HEADING (three digits)
Example: "Turn right heading 310"

JOIN (RIGHT or LEFT) (position in circuit) (runway)
Example: "Join right downwind runway 12"

EXTEND DOWNWIND

REPORT BEFORE TURNING BASE
REPORT READY FOR BASE TURN

sometimes incorrectly said as "Check before base", it means the same as the above two, namely that you have to contact the controller for permission to turn base

NUMBER (number) TO (position) [FOLLOW (aircraft)]

Example: "Number two to final, follow the Cessna presently on left base"

MAKE SHORT APPROACH

SHOW LANDING LIGHT

switch landing light on for better identification

CONTINUE APPROACH

Note: you cannot be given landing clearance as long as another aircraft is on the runway. Avoid getting a "continue approach" by reporting final only when the preceding traffic has vacated the runway

ORBIT RIGHT (or LEFT) FROM PRESENT POSITION

execute a 360 degree turn

GO AROUND

apply power and overshoot

CAUTION WAKE TURBULENCE

CLEARED TO LAND [RUNWAY (number)]

CLEARED TOUCH AND GO

VACATE RUNWAY AT (taxiway)

Example: "Vacate runway at Charlie"

EXPEDITE TAXI

hurry up

8.10 SAMPLE R/T PROCEDURES

The following are some sample procedures for various types of flights in controlled and uncontrolled airspace. It cannot be emphasised enough, that although procedures in controlled and uncontrolled airspace sound very similar, the implications are totally different and pilots must be aware of what type of airspace they are currently flying in. In the following samples, groups of letters and figures have not been spelt out. It is understood, though, that these are spoken in individual letters according to the phonetic alphabet and that numbers are spoken separately, i.e. JGP is "Juliet Golf Papa", 118.1 is "one one eight decimal one" etc.

8.10.1 A VFR FLIGHT FROM CAPE TOWN TO GEORGE

This flight takes off and lands at a controlled airfield. After take-off the flight is at first conducted in controlled airspaces (Malan ATZ/CTR, then the Cape Town TMA), it then proceeds into uncontrolled airspace until it re-enters controlled airspace (the George TMA and ATZ). A flight plan is mandatory for this flight since it is conducted at least partly in controlled airspace.

In the parking area:
A/c: "Malan Ground, ZS-KKU on 121.9"
GND: "KKU, Malan Ground, transmit"
A/c: "KKU VFR to George as per flight plan, request taxi"
GND: "KKU, taxi holding point runway 19, QNH 1018"
A/c: "Taxi holding point runway 19, QNH 1018, KKU"

The aircraft starts taxying, then sometime:
GND: "KKU, contact Tower 118.1 when ready for departure"
A/c: "Tower 118.1 when ready, KKU"

At the holding point, after pre-take-off vital actions and when ready to depart, the pilot changes frequency, listens out and calls Tower. Tower has been notified by Ground and is expecting the call.
A/c: "Malan Tower, KKU is ready"
TWR: "KKU is cleared take-off, wind 210/15, left hand out, remain below 1500 feet, contact Approach 119.7 passing Blackheath"
A/c: "Cleared take-off, left hand out, to remain below 1500 feet, Approach 119.7 passing Blackheath, KKU"

The aircraft takes off, turns left, levels off below 1500 feet and when passing Blackheath changes frequency, listens out and calls:
A/c: "Cape Town Approach, KKU"
APP: "KKU, Approach, transmit"
A/c: "KKU is passing Blackheath, 1500 feet, estimate SP at 19"
APP: "KKU, climb to FL75, report SP"
A/c: "Climb FL75, report SP, KKU"

At Sierra Papa (Sir Lowry's Pass):
A/c: "Cape Town Approach, KKU, SP at 19, passing FL60, estimate GE at 31"
APP: "KKU, report reaching FL75"

When the aircraft has levelled off at FL75:
A/c: "Cape Town Approach, KKU"
APP: "KKU, Approach"
A/c: "FL75, estimate Greyton at 32, KKU"
APP: "KKU, report Greyton"

At Greyton NDB (note that the aircraft is leaving controlled airspace at Greyton and will now continue in uncontrolled airspace):
A/c: "Cape Town Approach, KKU at GE at 32, FL75, estimate George at 1036"
APP: "KKU, contact Cape Town Information on 125.1"
A/c: "Cape Town Information on 125.1, good day"

The pilot now changes frequency, listens out, then says:
A/c: "Cape Town Information, KKU"
INFO: "KKU, Cape Town"
A/c: "KKU at GE at 0932, FL75, estimate Swellendam at 52"
INFO: "No reported traffic FL75, report Swellendam"
A/c: "Report Swellendam, KKU"

At Swellendam:
A/c: "Cape Town Information, KKU"
INFO: "KKU, Cape Town Information"
A/c: "Swellendam at 53, FL75, estimate Riversdale at 1011, KKU"
INFO: "KKU, traffic is a Beech Baron ZS-IHN, from Riversdale to Cape Town, FL80, estimating Swellendam at 59. Report at Riversdale"
A/c: "Looking out, report Riversdale, KKU"

At Riversdale:
A/c: "Cape Town Information, KKU"
INFO: "KKU, Information"
A/c: "Riversdale at 1012, FL75, estimate George at 1037"
INFO: "KKU, contact George now on 118.9, good day"
A/c: "George 118.9, good day"

The pilot now changes frequency to 118.9 and listens out. George (GG) has a combined Approach and Aerodrome Control and is therefore usually just called "George":
A/c: "George, KKU"
GG: "KKU, George, transmit"
A/c: "KKU, Riversdale 1012, FL75, estimate George at 37"
GG: "KKU, enter controlled airspace at FL75, report passing Mosselbay"
A/c: "Enter controlled airspace FL75, report passing Mosselbay, KKU"

The aircraft continues, and when abeam Mosselbay, says:
A/c: "George, KKU passing Mosselbay at 20, FL75, estimate George at 37"
GG: "KKU, VFR descent when ready, report field in sight for left downwind runway 29, QNH 1023"
A/c: "VFR descent, report field in sight for left downwind 29, QNH 1023, KKU"

When the pilot can see the airfield:
A/c: "KKU, field in sight"
GG: "KKU, report left downwind 29"

When on downwind:
A/c: "KKU is left downwind 29"
GG: "KKU, you are number two to an Airbus on final, report traffic in sight"
A/c: "We have the Airbus in sight, KKU"
GG: "KKU, report final number two to the Airbus"
A/c: "Final number two to the Airbus, KKU"

On final:
A/c: "Tower, KKU final 29"
GG: "The wind is 280 at 15 knots, KKU is cleared to land"
A/c: "Cleared to land, KKU"

After the aircraft has landed and is still on the runway:
TWR: "KKU, first right to the apron"
A/c: "First right, KKU"

8.10.2 AN IFR FLIGHT FROM JAN SMUTS TO CAPE TOWN

(General licence only)

This flight is conducted entirely in controlled airspace, a flight plan has been filed.

On the apron, in parking bay C8, prior to start-up, the pilot contacts the Clearance Delivery to obtain his after departure clearance:
A/c: "Jan Smuts Clearance Delivery, ABC"
121.7: "ABC, Clearance Delivery"
A/c: "ABC in C8, request Level 280 to Cape Town, endurance 0420, 8 on board"
121.7: "ABC, Information Juliet with QNH 1017, runway 03L. Your clearance: ABC is cleared to Cape Town, after departure runway 03 left, climb straight ahead to 5.5 DME, turn left heading 280 to intercept radial 045 GAV, climb to 8000 feet. Further climb will be under radar control. At GAV set course as per flight plan. Squawk 3273, contact Approach 123.7 passing 7000 feet".
A/c: "Cleared Cape Town, after departure runway 03 left, climb straight ahead to 5.5 DME, turn left heading 280 to intercept radial 045 GAV, climb to 8000 feet. Further climb under radar control. At GAV set course as per flight plan. Squawk 3273, contact Approach 123.7 passing 7000 feet, ABC".

121.7: "ABC, readback correct.
A/c: "ABC"

The aircraft is now ready for start-up and contacts the Surface Movement Control on 121.9:
A/c: "Smuts Ground, ZS-ABC at C8, request start-up"
GND: "ABC, Smuts Ground, start-up approved, time 51, Information Juliet with QNH 1017, runway 03 left"
A/c: "Start-up approved, time 51, Information Juliet, QNH 1017, runway 03 left, ABC"

After start-up, when ready to taxi (Hotel, Lima and Charlie are taxiways):
A/c: "Smuts Ground, ABC requests taxi"
GND: "ABC, taxi via Hotel, Lima, Charlie to the holding point runway 03 left. Crossing taxiway Charlie monitor Smuts Tower 118.1"
A/c: "Taxi via Hotel, Lima, Charlie to the hold 03 left. Monitor 118.1 crossing Charlie, ABC"

When crossing taxiway Charlie, the pilot changes frequency to 118.1 and says:
A/c: "ABC monitoring 118.1"

When the aircraft is approaching the holding point:
TWR: "ABC behind the landing Boeing 737 line up behind"
A/c: "Line up behind the landing 737, ABC"

When the 737 has vacated the runway:
TWR: "ABC is cleared take-off, wind 050 at 13"
A/c: "Cleared take-off, ABC"

When passing 7000 feet:
A/c: "Johannesburg Approach, ABC"
APP: "ABC, under radar control, turn left heading 265, climb to FL100"
A/c: "Turning left heading 265, climbing to FL100, ABC"

A little later:
APP: "ABC, turn left to GAV, climb to FL130"
A/c: "Turning left to GAV, climbing to FL130, ABC"
APP: "ABC, contact Area South now on 128.3, good day"
A/c: "Area 128.3, good day, ABC"

The pilot changes frequency, listens out, then says:
A/c: "Johannesburg Area South, ABC"
JS: "ABC, under radar control, climb to FL210, route direct VWV"
A/c: "Climbing to FL210, routing direct VWV"

A short while later:
JS: "ABC, climb to FL280"
A/c: "Climbing to FL280, ABC"

JS: "ABC, contact Bloemfontein 120.3, good day"
A/c: "Bloemfontein on 120.3, ABC"

The pilot changes frequency:
A/c: "Bloemfontein, ABC"
BL: "ABC, Bloemfontein, go ahead"
A/c: "ABC FIR in at 35, FL280, abeam BLV at 49, VWV at 1225, Cape Town at 1328, squawking 3273"
BL: "ABC, climb to FL310, report abeam BLV"
A/c: "Climbing to FL310, report abeam BLV, ABC"

Abeam Bloemfontein:
A/c: "Bloemfontein, ABC abeam BLV at 49, FL310, VWV at 1225"
BL: "ABC, report VWV"
A/c: "Report VWV, ABC"

At VWV (the FIR boundary between Bloemfontein and Cape Town):
A/c: "Bloemfontein, ABC VWV at 23, FL310, SLV at 53"
BL: "ABC, contact Cape Town 125.1, good day"
A/c: "Cape Town 125.1, ABC, good day"

Immediately, changing frequency:
A/c: "Cape Town, ABC"
CT: "ABC, route SLV, WY, CB, FL310, runway 19, squawk 3273, weather partly cloudy"
A/c: "To route SLV, WY, CB, FL310, runway 19, squawk 3273, ABC"

At Sutherland VOR (compulsory reporting point):
A/c: "Cape Town, ABC, SLV at 52, FL310, WY at 02, CB at 23"
CT: "ABC, radar identified, descend when ready to FL150, Information Golf, QNH 1027, and what will be your speed on the descent?"
A/c: "Descend when ready to FL150, we have Golf with 1027, indicating 260 on the descent, ABC"

A little later:
CT: "ABC, contact Approach now on 119.7"
A/c: "Approach 119.7, ABC"

Changing frequency:
A/c: "Cape Town Approach, ABC, good morning. Information Golf with 1027, passing level 193"
APP: "ABC, under radar control, descend FL90, report passing FL110, information Golf is current, QNH 1027, you will be number three for a radar vectored ILS approach runway 19"
A/c: "Descend to FL90, report passing FL110, number three for radar vectors for the ILS 19, ABC"

When passing FL110 on the descent:

A/c: "Approach, ABC passing FL110"
APP: "ABC, descend to 8000 feet, QNH 1027, 52 radar track miles to touch-down[1]"
A/c: "Descending to 8000 feet, QNH 1027, ABC"

A short while later:

APP: "ABC, turn right heading 275, descend to 5000 feet, you are number two now, 38 miles to touch-down"
A/c: "Turning right heading 275, descending to 5000 feet, number two, ABC"

Still later:

APP: "ABC, descend to 3000 feet, further descent on glidepath, 22 miles to touch-down, 8 miles east of localizer, expect final turn in 6 miles"
A/c: "Descending to 3000 feet, further descent on glide-path, standing by left turn, ABC"

APP: "ABC, turn left heading 230, closing localizer from the left, cleared for the ILS approach, report established"
A/c: "Left heading 230, cleared ILS approach, report established, ABC"

When the aircraft is established on the ILS:

A/c: "ABC established"
APP: "ABC, radar service terminates, contact Tower now on 118.1"
A/c: "Tower 118.1, ABC"

The pilot changes frequency, listens out and says:

A/c: "Malan Tower, ABC"
TWR: "ABC, continue, preceding light aircraft is half mile final for touch and go, wind 210/08, report outer marker"
A/c: "Report outer marker, ABC"

A/c: "ABC outer marker"
TWR: "ABC, cleared to land, the wind is 220 at 10 knots"
A/c: "Cleared to land, ABC"

After landing:

TWR: "ABC, vacate right taxiway Charlie, contact Ground 121.9 runway vacated"
A/c: "Right at Charlie, Ground 121.9, ABC"

After changing frequency when clear of the runway:

A/c: "Ground, ABC"
GND: "ABC, give way to a Baron leaving the SAFAIR ramp, taxi to the hangars"
A/c: "To the hangars, we'll give way to the Baron, ABC".

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[1] It is not compulsory for the controller to give radar track miles to touch-down, but the pilot may request this information at any stage.

8.10.3 A VFR FLIGHT FROM LICHTENBURG TO BETHLEHEM

This flight is conducted at FL75 entirely in uncontrolled airspace, and there is no contact possible between the aircraft and any ATSU. Neither of the two airfields is situated within a General Flying Area, and neither of them has been allocated a specific frequency, therefore the pilot uses 124.8 at both airfields for take-off and landing. After climbing through 1500' AGL, the pilot broadcasts on the Johannesburg FIS frequency for the south sector: 119.5. Abeam Kroonstad he crosses into the Bloemfontein Flight Information Region and will broadcast on the Bloemfontein Flight Information Service frequency 120.3.

If, at any stage during this flight, the pilot hears traffic broadcasts by other aircraft, these would have to be acknowledged.

In the parking area, before starting to taxi, the pilot will listen out on 124.8 and say:
"Lichtenburg Traffic, Warrior ZS-JGP is taxying to the holding point runway 18"

At the holding point when ready for take-off on 124.8:
"Lichtenburg Traffic, JGP is entering runway 18 for take-off. After take-off left turn out, climbing to flight level 75 for a flight to Bethlehem"

The aircraft takes off, turns out left, and when leaving the circuit, the pilot says on 124.8:
"Lichtenburg Traffic, JGP is leaving the circuit, climbing to flight level 75 for a flight to Bethlehem, estimate abeam Klerksdorp at 1015"

When passing 1500' AGL the pilot changes to the FIS frequency for the Johannesburg FIR below FL105, 119.5, and says, hoping for a reply:
"Johannesburg Information, ZS-JGP on 119.5"

No reply is received due to being out of range, therefore the pilot broadcasts:
"Traffic in the Lichtenburg area, JGP is airborne Lichtenburg for a flight to Bethlehem at FL75, estimate abeam Klerksdorp at 1015"

Abeam Klerksdorp on 119.5:
"Traffic in the Klerksdorp area, this is Warrior ZS-JGP on a flight from Lichtenburg to Bethlehem, abeam Klerksdorp at 1016, flight level 75, estimate abeam Kroonstad at 1045"

Abeam Kroonstad on 119.5:
"Traffic in the Kroonstad area, this is Warrior ZS-JGP on a flight from Lichtenburg to Bethlehem, abeam Kroonstad at 1046, flight level 75, estimate Bethlehem at 1120"

Since the aircraft is now flying into the Bloemfontein FIR, the pilot changes to the Bloemfontein FIS frequency 120.3 and says, hoping for a reply:
"Bloemfonteih Information, ZS-JGP on 120.3"

No reply is received due to being out of range, therefore the pilot broadcasts:
"Traffic in the Kroonstad area, Warrior JGP is on a flight from Lichtenburg to Bethlehem at FL75, estimate Bethlehem at 1120"

When about 5 nm from Bethlehem, the pilot announces his position to any possible traffic at Bethlehem:
"Bethlehem Traffic, Warrior ZS-JGP is 5 nm west of Bethlehem at 7500 feet, will be joining overhead Bethlehem at 7500 feet in two minutes"

When overhead, after having established the runway to use, on 124.8:
"Bethlehem Traffic, JGP is overhead Bethlehem at 7500 feet, will be joining left downwind runway 29"

On downwind on 124.8:
"Bethlehem Traffic, JGP is left downwind 29"

On base on 124.8:
"Bethlehem Traffic, JGP is left base 29"

On final on 124.8:
"Bethlehem Traffic, JGP is final runway 29"

After landing:
"Bethlehem, JGP is backtracking runway 29"

And when vacating the runway:
"Bethlehem, JGP is vacating runway 29"

9. RADIO FAILURE PROCEDURES

(Ref: AIC 41.3 - AIP RAC 1.8)

9.1 FAULT FINDING

When calling an ATSU and getting no reply, the pilot should at first presume that the "fault" lies with him or his radio procedures and should check the following:

- aircraft master switch is ON
- radio master switch is ON (if fitted)
- radio set is ON
- radio set switched to COM if set is the 'either COM or NAV' type
- correct frequency selected and "clicked in"
- squelch set correctly
- volume control turned up sufficiently
- audio panel switches set correctly (if fitted)
- microphone and/or headset plugged in
- microphone held the correct way around
- microphone not stuck in transmit mode (remove the microphone and listen for noise/talking)
- circuit breakers set.

If, after a second call to the ATSU there is still no reply, the pilot should try the following:

- tapping the microphone
- another radio set (if fitted) or a handheld radio
- headphones if speaker was used and vice versa
- another microphone
- checking connections and fittings as far as possible
- checking the aerial wires (if possible)
- another frequency.

All the above should be used with common sense. For example, if there is general "silence" in a normally busy environment, the fault is most likely on the receiving side, i.e. volume not turned up sufficiently, radio not switched ON etc. If the pilot can hear other aircraft and maybe even ATC, the problem seems to be on the transmitter, *e.g.* faulty microphone.

Far from a station the problem may be that the aircraft is simply out of radio range. VHF transmissions are subject to "line-of-sight", so a pilot cannot expect to be in radio contact if there is a mountain between the aircraft and the ground station. The curvature of the earth must also be taken into account. An approximate formula for radio range in VHF communications is:

$$\text{Range [nm]} = 1.25 * \sqrt{\text{altitude of aircraft - height of transmitter [feet]}}$$

Example: an aircraft at FL95 wants to communicate with a ground station at 4500 feet. At what distance from the ground station can the pilot expect to make contact?

According to formula:

$$\begin{aligned}\text{Range [nm]} &= 1.25 * \sqrt{9500 - 4500}\\ &= 1.25 * \sqrt{5000}\\ &= 1.25 * 70\\ &= 87 \text{ nm}\end{aligned}$$

If the aircraft is more than 87 nm from the station, radio communications are not possible and the pilot should either try to contact another, higher flying aircraft for a relay or he should wait until he is closer to the station.

9.2 RADIO FAILURE PROCEDURES - VFR FLIGHTS

(Ref: AIP RAC 1.8)

If the above fault finding procedures produce no result and if the aircraft is definitely within range of the ground station, a radio failure must be assumed. If the pilot can hear transmissions from other stations the aircraft's receiver is obviously working and only the transmitter has failed. In this case ATC might still issue the aircraft with instructions, which should be followed immediately. The controller might also request the pilot to execute a specific manoeuvre, *e.g.* an orbit to the left etc., in order to establish whether the aircraft's receiver is working.

If there is complete silence on the radio, it could be either a receiver only or a total radio failure. Because the pilot is unable to distinguish between these two he should assume that the transmitter is working and should transmit blind. Those transmissions must be prefixed with "transmitting blind", *e.g.* "Stellenbosch Traffic, JGP transmitting blind, left downwind runway 19". These reports should be kept brief and to the point, since the pilot now can't be sure that he is not interrupting other aircraft's transmissions.

9.2.1 IN UNCONTROLLED AIRSPACE

(Ref: AIP RAC 1-8)

When the radio of a VFR flight fails in uncontrolled airspace, the pilot must remain in uncontrolled airspace. He may continue his flight and land at any uncontrolled airfield of his choice. He must adhere to the normal joining procedures for uncontrolled airfields, make the appropriate radio calls, prefixing all messages with "transmitting blind" and should keep an extra careful lookout. If the aircraft was in contact with an

ATSU before the radio failure or if a flight plan was filed, the pilot must contact the nearest ATSU by telephone as soon as possible.

9.2.2 IN CONTROLLED AIRSPACE

(Ref: AIP RAC 1-8)

9.2.2.1 OUTSIDE THE CIRCUIT

When a VFR flight experiences a radio failure in controlled airspace, but outside the circuit of a controlled airfield, the pilot must leave controlled airspace on the shortest possible route. He should make one brief report "transmitting blind" to the ATSU he was in contact with before the failure, stating that the radio failed and what his intentions are. After that he must proceed to land at an uncontrolled airfield, observing all the rules for joining the circuit, transmitting blind and keeping a careful lookout for other traffic. After landing, he must telephone the appropriate ATSU as soon as possible.

9.2.2.2 IN THE CIRCUIT OF A CONTROLLED AIRFIELD

If the aircraft had been instructed to join the circuit of a controlled airfield before the radio failure, the pilot may carry on in the circuit and land, carefully observing the traffic and spacing himself so that other traffic is not inconvenienced. Again, after landing, he must telephone ATC. Please note that something like "JGP, report field in sight, expect a right downwind runway 19" is NOT an instruction to join the circuit. Only an explicit instruction like "JGP, join right downwind runway 19" is a clearance into the circuit.

9.3 RADIO FAILURE PROCEDURES - IFR FLIGHTS

(Ref: AIP RAC 1.8)
(all of 9.3 for the General Licence only)

Any aircraft on an IFR flight plan experiencing communications failure and equipped with a transponder should squawk code 7600.

9.3.1 WHEN FOLLOWING A SID OR STAR

Aircraft following a Standard Instrument Departure (SID) or a Standard Terminal Arrival Route (STAR) must comply with the specific Communications Failure Procedure as laid down for that particular SID or STAR and published in the AIP RAC 4. The following procedures do NOT apply to such aircraft. (for SIDs and STARs see chapter 13).

9.3.2 IN VMC

An aircraft flying on an IFR flight plan not following a SID or STAR and in Visual Meteorological Conditions at the time of the radio failure shall continue in VMC and land at the nearest suitable aerodrome, looking out carefully, transmitting blind as stated above and slotting in with any other traffic. Again, the nearest ATSU must be notified immediately after landing.

Note that "the nearest suitable aerodrome" for a light aircraft will certainly be an uncontrolled airfield, for an Airbus it might well be the original destination, *e.g.* Jan Smuts.

9.3.3 IN IMC

If it is not possible for an aircraft on an IFR flight plan and not following a SID or STAR to remain in VMC, the following procedures should be followed:

1. proceed according to current flight plan. If ATC has restricted the flight to a **lower** level than specified in the flight plan, this last cleared level must be maintained for three minutes on reaching. After the three minutes, the climb should be continued to flight plan level.

2. proceed to the NDB serving the aerodrome of destination and hold over this NDB until the last received Expected Approach Time (EAT), then commence the NDB approach. If no EAT has been received, hold over the NDB until the Estimated Time of Arrival (ETA) specified in the flight plan PLUS 10 minutes, then start the approach.
   Example: ETA was 1010, last acknowledged EAT 1005. The aircraft must proceed to the destination NDB, hold there until 1005 (last received EAT). It will then commence the approach as soon as possible after 1005.

3. complete the normal NDB approach procedure.

4. land within 30 minutes after the Estimated Time of Arrival plus 10 minutes or the last acknowledged Expected Approach Time, whichever is the later.
   Example: ETA was 1320, last acknowledged EAT 1318. ETA (1320) is later than EAT (1318). ETA plus 10 minutes is 1330, therefore land between 1340 and 1410.

10. EMERGENCY COMMUNICATIONS

(Ref: AIC 41.3)

10.1 DISTRESS

Distress is defined as a situation in which an aircraft is in serious or imminent danger and in need of immediate assistance. A distress situation is, for example, an engine fire in flight or an engine failure with no suitable landing field within reach, when a serious crash seems unavoidable.

An aircraft in distress should send a message containing as much as possible of the following on the last frequency in use, on any other frequency or on the international emergency frequency 121.5:
- the word MAYDAY spoken three times
- the station addressed
- the identification of the aircraft
- the nature of the distress
- the intention of the pilot
- present position, altitude and heading

Example: "Mayday, mayday, mayday, Cape Town Information, Juliet Golf Papa, engine fire, intend landing on a field north of the N2 approximately 5 nm west of Caledon, overhead that field at FL75, heading west."

Distress communications have absolute priority over all other traffic messages, and all other communications shall cease until either the distress is cancelled or the distress traffic has been transferred to a different frequency. The exception will be, if on hearing a distress message which is obviously not acknowledged by any other station, in which case the aircraft hearing the message shall first acknowledge to the distressed aeroplane, then try to relay to the nearest ATSU or any other station which may be in a position to help.

10.2 URGENCY

Urgency is defined as a situation concerning the safety of an aircraft or other vehicle or of some person on board or within sight, but which does not require immediate assistance. An urgency situation might be an engine failure with a suitable forced landing field in sight and a chance of landing relatively safely.

An aircraft sending out an urgency message should state as much as possible of the following on the last frequency in use, on any other useful frequency or on the international emergency frequency 121.5:

- the word PAN spoken three times
- the station addressed
- the identification of the aircraft
- the nature of the urgency
- the intention of the pilot
- present position, altitude and heading
- any other useful information

Example: "Pan, pan, pan, Cape Town Approach, Juliet Golf Papa, a passenger seams to have a heart attack. We are just south of Malmesbury, 4500 feet, heading south. Intend returning to Malan, request the shortest approach possible and request an ambulance on the apron upon landing".

Urgency communications have priority over all other traffic messages except distress, and all other stations shall take care not to interfere with the transmission of urgency traffic. If on hearing an urgency message which is obviously not acknowledged by any other station, the pilot hearing the message shall first acknowledge, then try to relay to the nearest ATSU or any other station which may be in a position to help.

11. SEARCH AND RESCUE

(Ref: AIP SAR - AIC 40.2 - ROA 9)

11.1 FLIGHTS SUBJECT TO SAR

Search and Rescue (SAR) will be instituted for any overdue aircraft which has requested SAR in its Flight Plan. It is automatic for overdue flights between two controlled airfields and for all flights conducted in controlled airspace, except those crossing an airway at right angles.

SAR actions will be instituted depending on the request of the pilot in item 18 of the Flight Plan. Remember though, that a Flight Plan is only a prior notification of an intended flight. The flight plan must be activated over the radio channels to become "active", and only then will SAR be given should the need arise.

SAR/NORMAL can only be specified when the destination is a manned airfield and the flight is at least partly in controlled airspace. It cannot be specified if the aircraft will be out of radio range while in controlled airspace, which is still possible in parts of South Africa, until more relay stations have been built.

SAR starts when:

- 5 minutes overdue at reporting points in controlled airspace
- overdue at destination

SAR/NORMAL/EN ROUTE can only be specified when the destination is a manned airfield and the flight is at least partly in uncontrolled airspace. The pilot must ensure that radio contact is possible during the whole course of the flight.

SAR starts when:

- 5 minutes overdue at reporting points in controlled and uncontrolled airspace
- overdue at destination

SAR/place/time - where 'place' is the ATSU which must start SAR procedures if not notified by the 'time' specified in UTC.

SAR starts when:

- 5 minutes overdue at reporting points in controlled airspace
- ATC has not been notified by the time stated

SAR/place/time/EN ROUTE - where 'place' is the ATSU which must start SAR procedures if not notified by the 'time' specified in UTC. Again, the pilot must ensure that he can be in radio contact throughout the flight.

SAR starts when:

- 5 minutes overdue at reporting points in controlled and uncontrolled airspace
- ATC has not been notified by the time stated

SAR/NIL can only be specified if the destination is an uncontrolled airfield.

SAR starts when:

- 5 minutes overdue at reporting points in controlled airspace

11.2 SEARCH AND RESCUE PHASES

(Ref: AIP SAR - AIC 40.2 - ROA 9)

The following phases of Search and Rescue can be declared by the station co-ordinating the search depending on circumstances.

If a pilot fails to comply with the Search and Rescue requirements due to his own negligence, *e.g.* does not notify ATC of his safe landing even if it was possible to do so, he may be held responsible for the usually quite considerable costs incurred.

11.2.1 UNCERTAINTY PHASE (INCERFA)

INCERFA will be declared if uncertainty exists as to the safety of an aircraft and its occupants, i.e.

- when it is not in radio contact within 30 minutes after the ETA at the next reporting point or a pre-arranged or scheduled reporting time,
- when it is known or believed to be subject to irregular operation, i.e. is not maintaining the correct track or flight level, is not in normal communications, is experiencing navigational difficulties or hazardous weather conditions,
- when an aircraft operating on 'overdue at destination only' is not in contact with an ATSU within 1 hour after ETA,
- when an aircraft has not contacted an ATSU by the prearranged time and preliminary checks fails to reveal the whereabouts of the aircraft.

11.2.2 ALERT PHASE (ALERFA)

ALERFA will be declared if apprehension exists as to the safety of an aircraft and its occupants, i.e.

- following an INCERFA,
- when information is received which indicates that the aircraft is experiencing difficulties but not to the extent that a forced landing is likely,
- when an aircraft is not operating under normal circumstances or is lost and there is reason to believe that the aircraft's safety is in jeopardy.

11.2.3 DISTRESS PHASE (DETRESFA)

DETRESFA will be declared when there is reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger or require immediate assistance, i.e.

- following an ALERFA,
- when information is received which indicates that the aircraft is experiencing difficulties to the extent that a forced landing is likely,
- when information is received that the aircraft has made a forced landing, has ditched or crashed,

- when the fuel as stated in the flight plan is exhausted,
- an aircraft which has been given approach or landing clearance fails to land within five minutes of the estimated landing time and no contact can be made,
- an aircraft after take-off fails to report within five minutes after being expected to do so, and no contact can be made.

11.3 PROCEDURES TO BE FOLLOWED BY AIRCRAFT

(Ref: AIP SAR - AIC 40.2)

11.3.1 THE FIVE GOLDEN RULES

Aircraft experiencing difficulties of any kind should remember and adhere to the following 'five golden rules':

- CONFESS your predicament to ATC. It may be embarrassing to receive a 'nasty' letter because you got yourself into cloud without having an Instrument Rating, but it is far preferable to not being able to receive any letters anymore ever.

- COMMUNICATE with ATC, passing as much pertinent information in the first message. It wastes everybody's time if you have 20 minutes' worth of fuel left and ATC, blissfully unaware of this fact, starts to direct you to an airfield 30 minutes flying time away.

- CLIMB for better radar coverage, improved direction finding and better map reading.

- COMPLY with instructions and advice given, but don't be afraid to state if you are unable to comply. ATC might ask you to climb for better radar coverage, but they might be unaware that a climb would put you into cloud.

- CONSERVE fuel and other resources. Slow down and use power for maximum endurance.

11.3.2 ACTION AFTER A FORCED LANDING

If a pilot has successfully executed a forced landing, he must use his discretion as to what actions to take after landing.

In a populated area or if the aircraft was not operating on a SAR flight plan, it might be better to leave the aircraft, if possible, and go looking for help.

If SAR was requested and the forced landing took place in a sparsely populated area it will normally be better to stay with the aircraft. Removable parts of the aircraft can be placed in open, conspicuous positions, reflecting the rays of the sun. If possible, transmit on the COM radio or an Emergency Locator Transmitter at quarter past and quarter to every hour, i.e. at 0715, 0745, 0815, 0845 etc., but leave an ELT on continuously if search aircraft are in the vicinity. Use flares or other signalling devices only when search aircraft can be heard. Last but not least, conserve the strength of survivors, water, food and other resources.

11.3.3 GROUND/AIR EMERGENCY SIGNALLING CODE

For every flight of more than 20 nm from base, a set of signal strips must be carried. This set consists of four strips of white material, each at least 60 cm by 2.5 m. These should be used in case of a forced landing to lay out the following signals:

Require assistance	V
Require medical assistance	X
No, negative	N
Yes, affirm	Y
Proceeding in this direction	→

12. SPECIAL AREAS

(Ref: NOTAM A025/92 (Namibia) - NOTAM A058/92 (Jo'burg, Hoedspruit, PE, EL) - NOTAM A032/92 (Jo'burg, Hoedspruit, PE, EL) - NOTAM B107/90 (Windhoek) - NOTAM B057/91 (Jo'burg, Bloem) - AIP RAC 3.6 (Jo'burg))

Special rules may be published for certain areas, usually around busy centres. These may include routes to be flown, altitudes to be adhered to, frequencies to be used and other special rules. It is not within the scope of this book to discuss all the existing special rules. **Pilots are therefore advised to acquaint themselves with the relevant NOTAMs and any others that may have been published in the meantime before flying in the those areas.** Some of the special areas are discussed below.

12.1 JOHANNESBURG

(Ref: NOTAM A032/92 - NOTAM A058/92 - NOTAM B057/91 - AIP RAC 3.6)

12.1.1 JOHANNESBURG SPECIAL RULES AREA

(Ref: NOTAM A032/92 - NOTAM A058/92 - AIP RAC 3.6)

The **uncontrolled** airspace below the lateral boundaries of the Johannesburg and Waterkloof TMAs excluding General Flying Areas has been declared the "Johannesburg Special Rules Area". The two TMA's lower limit is 7600' ALT, for the lateral limits refer to the map on page 94. Please note that further exceptions exist for the "Springs Corridor" discussed in chapter 12.1.6.

VFR flights in the Johannesburg Special Rules Area must operate at specified altitudes on Jan Smuts QNH:

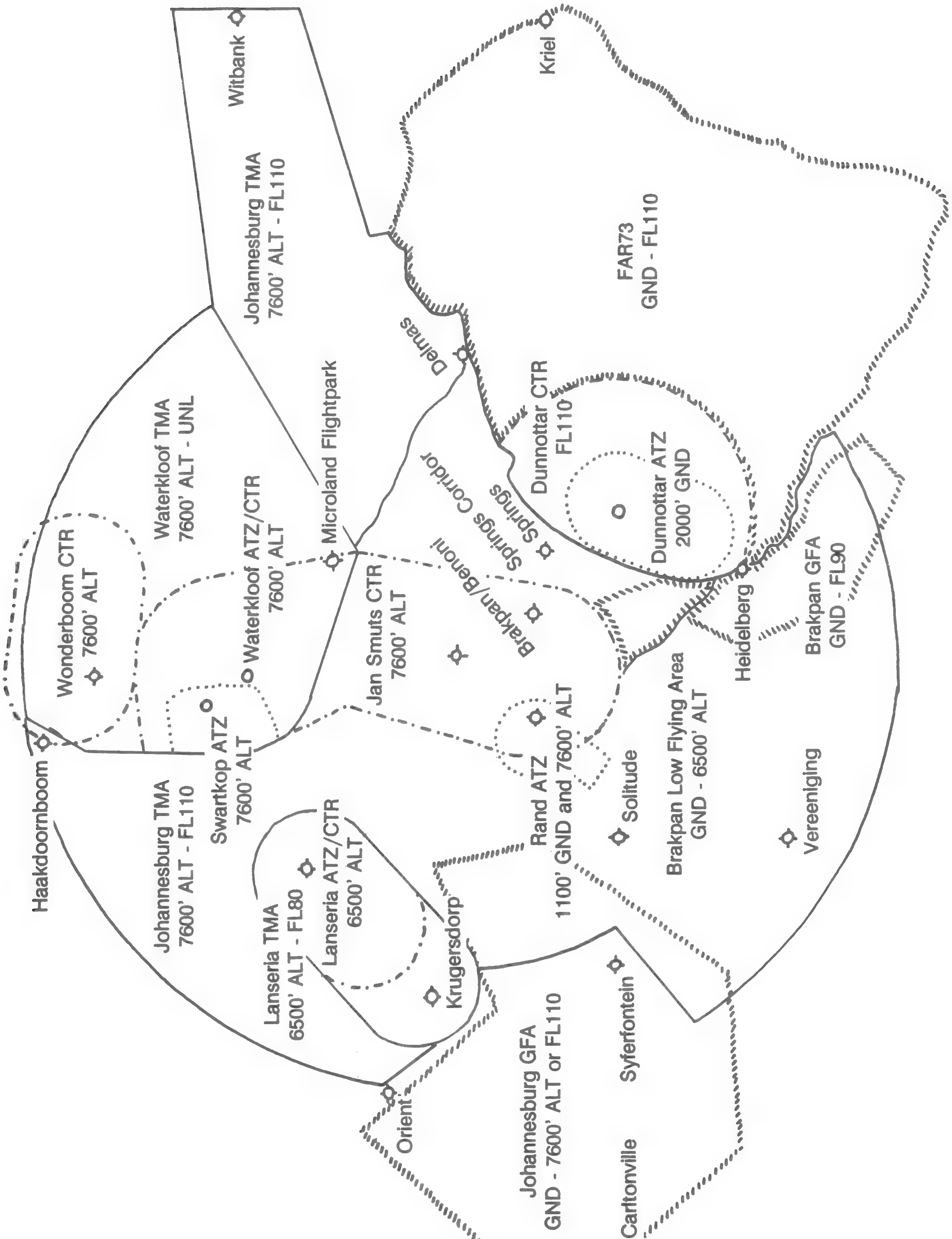
• on Magnetic Tracks between 090 and 269 (flying south)	7000' ALT
• on Magnetic Tracks between 270 and 089 (flying north)	7500' ALT
• if aircraft can't comply with above (incl. traffic helicopters)	6500' or below

Aircraft are not to exceed a speed limit of 180 knots indicated, and landing lights should be continuously displayed, if possible.

Flights in this area must broadcast their intentions on frequency 125.8, and circuit reports for airfields within this area (*e.g.* Solitude) are also to be made on 125.8.

Note: General Flying Areas do not form part of the Johannesburg Special Rules Area, and aircraft operating in the GFAs or at airfields within the GFAs broadcast on the normal GFA frequency 124.4.

JOHANNESBURG AIRSPACE



12.1.2 FLIGHTS IN JOHANNESBURG CONTROLLED AIRSPACE

(Ref: NOTAM A032/92 - AIP RAC 3.6)

VFR flights wishing to operate in the Jan Smuts CTR and the Johannesburg TMA and CTA must adhere to the normal rules governing operations in controlled airspace.

IFR flights to or from Jan Smuts and Waterkloof should arrange their climb or descent to cross the lateral boundary of the CTR above 7600' ALT.

12.1.3 FLIGHTS TO AND FROM PRETORIA/WONDERBOOM

(Ref: NOTAM A032/92)

Aircraft flying between Wonderboom and the areas east and south-east of Wonderboom must proceed east of Mamelodi township to ensure separation from aircraft operating at Waterkloof.

If a pilot wants to fly between Mamelodi township and the Waterkloof CTR he has to contact Waterkloof on 124.1.

Circuits at Wonderboom are flown to the north, i.e. left-hand circuits on runways 06 and 11, and right-hand circuits on runways 24 and 29.

12.1.4 RAND AIRPORT

(Ref: NOTAM A032/92)

Circuits at Rand Airport must be flown away from Jan Smuts, i.e. left-hand circuits on runways 36 and 29 and right-hand circuits on runways 18 and 11.

12.1.5 GRAND CENTRAL AERODROME

(Ref: NOTAM A032/92)

Circuits at Grand Central Aerodrome must be flown away from Jan Smuts, i.e. left-hand circuits for runway 35 and right-hand circuits for runway 17.

12.1.6 SPRINGS CORRIDOR

(Ref: NOTAM A032/92 - NOTAM A058/92 - AIP RAC 3.6)

Due to the limited space available between the Jan Smuts and the Dunnottar CTRs special procedures have to apply in the "Springs Corridor" (see map). The vertical extent of the Springs Corridor is from Ground to 7600' ALT.

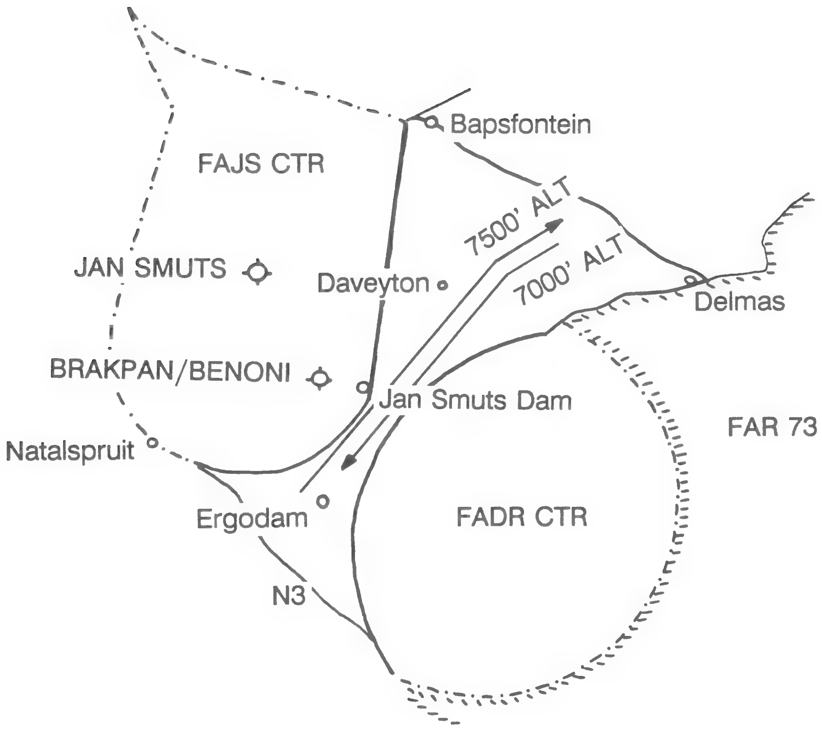
12.1.6.1 ALTITUDES AND FREQUENCIES

In the Springs Corridor eastbound aircraft must operate at 7500' on Jan Smuts QNH, while westbound traffic must fly at 7000' ALT. Only helicopters and aircraft to/from Brakpan/Benoni may operate below 7000'. All other aircraft entering this area must be in level flight at the appropriate altitude before entering. Aircraft taking off or landing at airfields within the corridor (*e.g.* Springs) must spend as little time as possible in climb or descent. Care must be taken that pilots don't stray into either of the two bordering control zones.

All aircraft flying in the Springs Corridor must communicate with Johannesburg Information on frequency:

- 119.5 between 0430 and 1800 UTC (6.30 am to 8 pm)
- 126.7 between 1800 and 0430 UTC (8 pm to 6.30 am)

DIAGRAM: SPRINGS CORRIDOR



12.1.6.2 FLIGHTS TO AND FROM BRAKPAN/BENONI

VFR flights leaving or arriving at Brakpan/Benoni to or from the north and east must follow a route south of Jan Smuts Dam, stay south and east of Daveyton and east of Bapsfontein. Jan Smuts Dam may only be passed at or below 6000'.

VFR traffic leaving or arriving at Brakpan/Benoni to or from the south and west shall route via the Ergo Slime Dam and stay south of Natalspruit railway station. Ergo Slime Dam must be passed at or below 6000'.

IFR and Special VFR flights taking off from or landing at Brakpan/Benoni have to obtain clearance from Jan Smuts on 118.1.

12.1.7 MANDATORY ROUTES ABOVE FL220

(Ref: NOTAM B057/91)

All aircraft operating above FL220 bound to or from airfields situated below the Johannesburg TMA or within 20 nm thereof have to follow certain laid down routes.

Aircraft outbound from Johannesburg to:

- Cape Town, Ysterplaat or Kimberley	route via GAV and KMV
- Bloemfontein, George or Welkom	route via GAV and WM
- East London	route via HGV and ELV
- Bisho	route via HGV and MU

Aircraft inbound to airfields within the Johannesburg area (but not Jan Smuts) from:

- the Cape Town FIR	route via WM and GAV
- Bloemfontein or George	route via BLV and GAV
- East London	route via HGV or GAV
- Bisho	route via MU and HGV or GAV

Aircraft inbound to Jan Smuts from:

- the Cape Town FIR (if INS/GPS/Omega equipped and able to route direct to WM)	route via WM and HG
- the Cape Town FIR (Standard navigation equipment)	route via BLV and HGV
- East London	route from ELV via HGV
- Port Elizabeth	route via BDV and HGV
- Bloemfontein or George	route via BLV and HGV
- Bisho	route via MU and HGV or GAV

12.1.8 VICTORIA FALLS - JOHANNESBURG

(Ref: AIP RAC 1.8)

When routing between Johannesburg and Livingston/Victoria Falls the southbound track is deemed to be 182° and the northbound track 002°. Aircraft flying south must therefore fly at even Flight Levels (plus 500' for VFR flights) and northbound aircraft at odd Flight Levels (plus 500' for VFR flights).

12.2 HOEDSPRUIT SPECIAL RULES AREA

(Ref: NOTAM A032/92 - NOTAM A058/92)

Aircraft operating below the lateral limits of the Hoedspruit TMA must contact Lowveld Information on frequency 119.0 and maintain a listening watch on that frequency.

12.3 BELOW THE PORT ELIZABETH TMA

(Ref: NOTAM A032/92 - NOTAM A058/92)

Aircraft operating below the lateral limits of the Port Elizabeth TMA must contact Port Elizabeth Approach on frequency 119.7 and maintain a listening watch on that frequency.

12.4 BELOW THE EAST LONDON TMA

(Ref: NOTAM A032/92 - NOTAM A058/92)

Aircraft operating below the lateral limits of the East London TMA (including the East London GFA) must contact Ben Schoeman Tower on frequency 118.3 and maintain a listening watch on that frequency.

12.5 BLOEMFONTEIN

(Ref: NOTAM B051/92)

12.5.1 TRAFFIC TO/FROM TEMPE

Pilots flying in the vicinity of Bloemfontein who wish to remain clear of controlled airspace must follow this routing within 45 nm of Bloemfontein:

- to Tempe from the north: fly at 6000'
  route via Soutpan, remain west of the Bultfontein-Bloemfontein road

- from Tempe to the north:	fly at 5500' remain west of the Bultfontein-Bloemfontein road until past Soutpan
- to Tempe from the south:	fly at 5500' remain west of the Bultfontein-Edenburg railway line
- from Tempe to the south:	fly at 6000' remain west of the Bultfontein-Edenburg railway line

12.5.2 TEMPE AIRFIELD

Powered aircraft must fly the circuits at Tempe to the north and west, i.e. left-hand circuits on runways 01 and 10 and right-hand circuits on runways 19 and 28. In calm conditions runway 01 must be used.

Gliders must fly the circuits at Tempe to the south and east, i.e. left-hand circuits on strips 18 and 27 and right-hand circuits on strips 36 and 09. In calm conditions strip 36 must be used.

All aeroplanes flying in the circuit at Tempe are to avoid the Bloemfontein CTR. That means early turn-outs when taking off on runways 09 and 10, and a short final approach when landing on runway 28.

12.5.3 J.B.M. HERTZOG AIRPORT

Right-hand circuits are to be flown on runway 30, unless otherwise instructed by ATC.

12.5.4 DE BRUG RANGE

De Brug Range is a Restricted Area (FAR29) from Ground to Unlimited, where ground firing, air-ground firing, bombing, rocket firing and parachute jumping takes place.

To ensure separation between military and civilian aircraft all traffic to and from Bloemfontein/Tempe and the west must route north of De Brug over the road bridge where the main Bloemfontein-Dealesville road crosses the Modderriver (IBRIS). Traffic to and from the west must not route south of De Brug.

12.6 PIETERSBURG

(Ref: AIP RAC 3.1.4.12 - AIP AGA 3.1.P3)

Due to the proximity of the civil and military airfields in Pietersburg, special procedures have to be followed in this area.

VFR traffic through the Pietersburg area must route west of Pietersburg, following the route Potgietersrus (NBD PR) - Dendron - Messina (NDB MI) or vice versa.

IFR traffic between Potgietersrus (NDB PR) and Messina (NDB MI) are to contact Pietersburg ATC on frequency 120.8 at the TMA boundary for clearance through the area.

All traffic to or from Pietersburg must contact Pietersburg Approach on frequency 120.8 for routing or clearances before entering controlled airspace or military flying areas.

The following routes and reporting points have to be adhered to by VFR traffic departing from or proceeding to Pietersburg civil aerodrome:

- North sector: route east of the railway line between Munnik - Solomondale
  inbound traffic to report abeam Louis Trichardt
- West sector: route via Ranch Motel
  inbound traffic to report before the mountains west of Pietersburg
- South sector: route via Zebedelia
  inbound traffic to report abeam PR or Zebedelia
- East sector: inbound traffic to report at or abeam Ebenezer Dam.

When Pietersburg Approach is not manned, aircraft must broadcast their position and intentions on 120.8.

Circuit altitude at the civil airfield is 5100' ALT. Circuits are to be flown left hand for runways 16 and 26, and right hand for runways 08 and 34.

12.7 NAMIBIA

12.7.1 ONDANGWA - WINDHOEK

(Ref: NOTAM A025/92)

Between Ondangwa and Windhoek, in the corridor defined by the points 172300S 152000E (northwest of Ondangwa), 172300S 154800E (northeast of Ondangwa), WHV and Eros Aerodrome all southbound aircraft are to operate at odd Flight Levels, and all northbound traffic is to fly at even Flight Levels.

12.7.2 VFR FLIGHTS TO/FROM EROS

(Ref: NOTAM B107/90)

All VFR traffic between Eros and any point south of 23°S and east of 17°E (in other words, all traffic between Eros and the southeast) is to route west of the Windhoek-Keetmanshoop road between Bergland railway siding and Windhoek and remain at or below FL95 to avoid the Windhoek TMA. South of Bergland traffic may route direct, but must stay at FL95 or below within a 50 nm radius of WHV.

13 IFR PROCEDURES

(This chapter for the General Licence only)

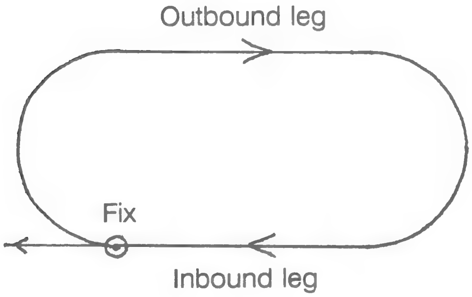
This chapter gives a few of the terms, definitions and procedures commonly used in Instrument Flying, and the radio phraseology and procedures associated with it.

13.1 HOLDING PATTERNS

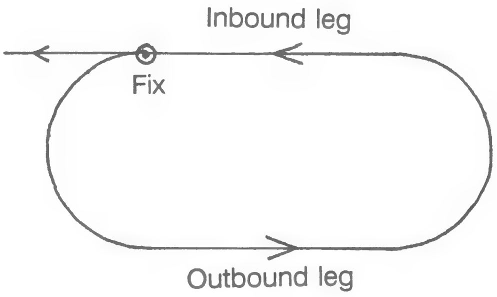
A holding pattern is a race-course pattern established at a certain fix used to delay aircraft for resolving traffic congestion or for spacing aircraft for an instrument approach.

Every holding pattern is defined by
- the fix (i.e. an NDB, a VOR, a DME distance on a specific VOR radial),
- the inbound track (as a track, QDM or radial),
- the direction of the turns (left, right), and
- the time to be flown on the outbound leg.

The fix and the inbound track have to be defined for every holding pattern. The standard pattern uses right turns (but due to terrain non-standard left patterns may be prescribed), standard timing is 1 minute on the outbound leg up to and including FL140, and 1½ minutes above that. Since the two 180° turns will take up 1 minute each, the standard time in the holding pattern in no wind is 4 minutes and 5 minutes respectively, in no wind conditions.



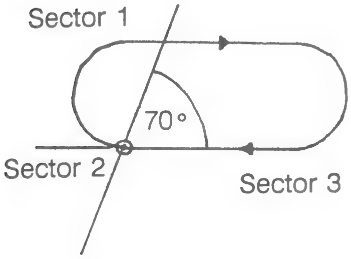
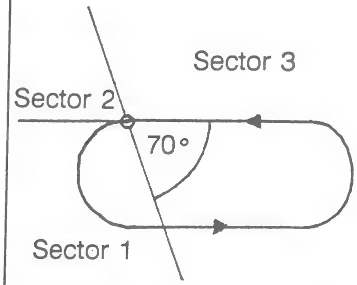
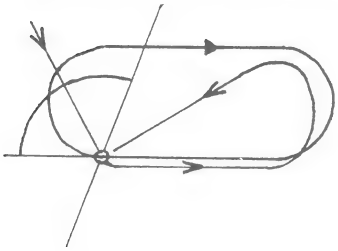
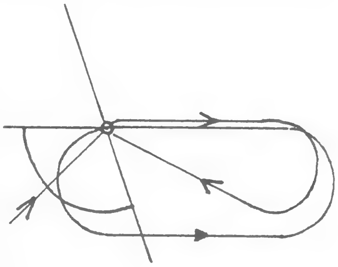
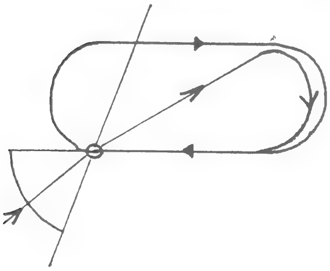
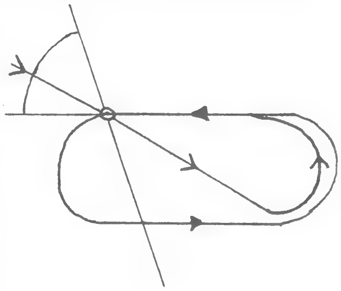
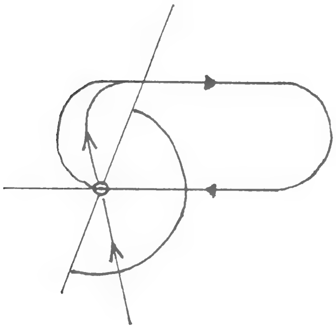
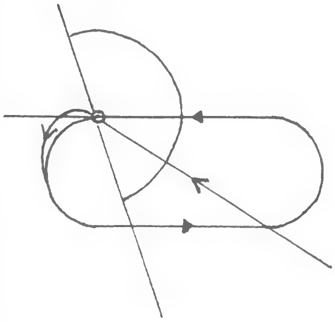
Right hand pattern

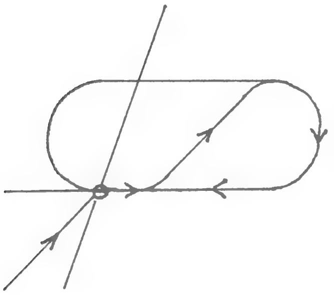
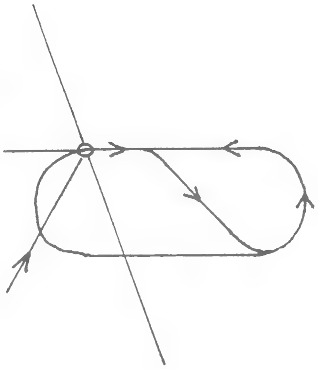


Left hand pattern

Although any necessary holding is usually done in published holding patterns, a controller could instruct a pilot to hold anywhere with the following phraseology: "ABC, hold at DE NDB, FL210, inbound track 068 degrees, right hand pattern, outbound time 2 minutes, expect further clearance at 1035".

13.2 ENTRY PROCEDURES

Right hand patterns		Left hand patterns
	To join a holding pattern a certain entry manoeuvre has to be flown, depending on the direction from which the aircraft reaches the fix.	
	**Sector 1: Parallel Entry** at the fix turn onto the outbound heading to fly parallel to the inbound track for 1 minute, then turn into the pattern to return to the fix.	
	**Sector 2: Teardrop Entry** at the fix turn into the pattern on the outbound heading +/- 30° to make good a track 30° removed from the reciprocal of the inbound heading. Fly for 1½ minutes, then turn in the direction of the holding pattern to intercept the inbound track.	
	**Sector 3: Direct Entry** at the fix turn to follow the holding pattern.	

Right hand pattern		Left hand pattern
	**Procedure Turn:** May be done with permission from ATC when approaching the fix from sector 1 or 2: at the fix turn onto the outbound track, fly for 1 minute. Turn into the pattern on outbound heading +/- 45°, fly for 1 minute from the commencement of the turn. Turn in the opposite direction to intercept the inbound track.	

13.3 INSTRUMENT APPROACHES

An instrument approach is a published procedure with regard to specific tracks over ground and given altitudes or descent patterns. An instrument approach is necessary to position the aircraft for landing in Instrument Meteorological Conditions.

An instrument approach consists typically of 5 segments:

- the **Arrival Segment** is the route followed from the last en-route fix to the first fix associated with the approach (Initial Approach Fix - IAF). During the Arrival Segment the aircraft must maintain the Minimum Safe Sector Altitude (MSA) unless under radar control. If the en-route tracking ends at the IAF there is no Arrival Segment as such.
- the **Initial Approach Segment** commences at the IAF and in South Africa usually consists of a holding pattern to lose altitude. These holding patterns are published with a certain maximum length (typically 5 to 8 nm), so that the pilot has to adjust his time on the outbound leg to remain within the pattern. Depending on aircraft speed, vertical speed and wind the time for the outbound leg may vary considerably. The Initial Approach Segment often ends again at the same facility used as the IAF, but at a lower altitude, when commencing the last outbound turn.
- the **Intermediate Approach Segment** is often the last outbound leg (on which the pre-landing or downwind checks are completed), the inbound turn, and some of the further inbound track. It ends at the Final Approach Fix (FAF), which often is again the same facility as the IAF.
- the **Final Approach Segment** commences at the Final Approach Fix. For a non-precision approach (*e.g.* an NDB approach) this is usually the Locator Outer Marker (LOM). For a precision approach (ILS) this would be where the Intermediate Approach intersects the glideslope. The Final Approach Segment ends at the Missed Approach Point (MAP).

the **Missed Approach Segment** starts when the pilot cannot see the runway at Decision Altitude (DA) for a precision approach, or when reaching the Missed Approach Point at Minimum Descent Altitude on a non-precision approach. The Missed Approach Segment involves a climb and turn back to the facility. It ends with the commencing of another approach, the return to a holding patten or the resuming of en-route flight to an alternate aerodrome.

13.3.1 DEFINITIONS

Clearance Limit: the limit to which a flight may proceed when experiencing a radio failure after having been cleared. For an instrument approach the clearance limit is the end of the missed approach procedure, in other words, the pilot may fly the missed approach procedure and then commence a second approach, following the rules as discussed in the chapter on radio failure procedures for IF flights.

Decision Altitude/Height (DA/H): the altitude or height at which a missed approach must be initiated on a precision approach, if the runway is not visual.

En-route Safe Altitude: at least 1500' above the highest obstacle within 5 nm of the aircraft.

Minimum Descent Altitude/Height (MDA/H): the altitude or height below which an aircraft on a non-precision approach may not descend without the runway in sight.

Minimum Sector Safe Altitude (MSA): the lowest altitude around 25 nm of a facility. This altitude may only be left when under radar control or when commencing the Initial Approach Segment.

Missed Approach Point (MAP or MAPt): the point where a missed approach must be initiated by the latest.

Non-precision Approach: an instrument approach giving azimuth guidance only. NDB or VOR approaches are examples.

Precision Approach: an instrument approach giving precise guidance both in azimuth and height. The Instrument Landing System (ILS) is an example.

Visual Approach: IFR flights approaching an airfield may request and be cleared for a Visual Approach when the reported cloud ceiling is not below the initial approach altitude and it is reasonably assured that the approach can be completed with visual reference to the ground. The pilot would ask for a visual approach with the words: "Request visual approach". Aircraft executing a Visual Approach will still be separated from other traffic.

Visual Descent Point (VDP): the point where a normal descent path to the runway in a straight-in non-precision approach intersects the Minimum Descent Altitude (MDA).

VDPs are published as a DME distance and are based on a touch-down point 1000' from the runway threshold. It is not mandatory to initiate a missed approach at the VDP - the pilot may continue in level flight at the MDA until the Missed Approach Point (MAP) - but it is recommended.

VMC Descent: may be requested by the pilot by day in VMC with the words "request VMC descent". The aircraft must then maintain its own terrain separation and will not be separated from other traffic, but will receive essential traffic information.
Example: a pilot flies in perfectly clear weather above a solid cloud layer with the cloud tops at 6000'. He can see all mountains above 6000', but must eventually do an instrument approach to get below cloud. He may "request a VMC descent to cloud tops" to do a gradual descent to below MSA but above cloud tops.

13.4 ASSOCIATED RADIO PROCEDURES

13.4.1 AN NDB APPROACH

ABC is approaching Phalaborwa from Pietersburg for an NDB approach runway 19; a Flight Plan was filed. Phalaborwa is not radar equipped. The following would be an example of the radio transmissions from the time the aircraft first establishes contact with Phalaborwa (Approach and Aerodrome Control combined, frequency 118.3).

A/c: "Phalaborwa, ABC"
PHA: "ABC, Phalaborwa, transmit"
A/c: "25 miles west of Phalaborwa, FL90, estimate PW 1010, ABC"
PHA: "ABC, route direct PW for the NDB approach runway 19, descend to 3600', QNH 1023, report PW outbound"
A/c: "To route direct PW for NDB approach 19, descend to 3600', QNH 1023, report PW outbound, ABC"

The aircraft descends to 3600' and tracks to PW NBD. Coming from sector 1, the pilot flies a parallel entry once overhead PW. He reports again when the entry procedure is completed and he is again overhead PW.

A/c: "ABC at PW outbound 3600', request descent"
PHA: "ABC, cleared for the NDB approach, report turning inbound"
A/c: "Cleared for the NDB approach, report turning inbound, ABC"

The aircraft now descends to 2500' on the outbound leg (because this is part of the published NDB approach procedure, the controller does not specifically mention the descent to 2500'), completes the pre-landing checks, turns inbound level at 2500' and reports:

A/c: "ABC turning inbound 2500'"
PHA: "ABC, cleared to land, wind 200/10"
A/c: "Cleared to land, ABC"

Lets assume that on reaching his MDA of 2000' the pilot cannot see the runway. He then flies level until the Missed Approach Point (PW NDB in this case), still cannot see the runway and initiates the Missed Approach procedure, turning left onto track 120, climbing to 2500', then turning right, climbing to 3500' and returning to PW. He announces this with the words:

A/c: "ABC, missed approach, request to return to PW for a procedure turn approach"
PHA: "ABC, procedure turn approach approved, report PW 3500'"
A/c: "Procedure turn approach approved, report PW 3500', ABC"

At PW NDB at 3500':
A/c: "PW 3500', ABC"
PHA: "ABC, cleared for the NDB procedure turn approach, report turning inbound"
A/c: "Cleared for the NDB procedure turn approach, report turning inbound, ABC"

The aircraft descends again to 2500', this time following the procedure turn, completes the pre-landing checks again, turns inbound at 2500' and reports:

A/c: "ABC turning inbound 2500'"
PHA: "ABC, cleared to land, wind 210/12"
A/c: "Cleared to land, ABC"

This time the pilot can see the runway at MDA and proceeds to land.

13.4.2 AN ILS APPROACH

ABC is on an IFR flight from Port Elizabeth to George; a Flight Plan was filed. George does not yet have radar. The following would be an example of the radio transmissions from the time the aircraft first establishes contact with George (Approach and Aerodrome Control combined, frequency 118.9).

A/c: "George, ABC"
GG: "ABC, George, transmit"
A/c: "25 miles east of George, FL80, estimate GG 1010, ABC"
GG: "ABC, route direct GG for the ILS approach runway 29, QNH 1023, report GG 8000'"
A/c: "To route direct GG for ILS approach 29, QNH 1023, report GG 8000', ABC"

The aircraft tracks to GG NBD. Coming from sector 3, the pilot flies a direct entry once overhead GG. After that he will have to descend from 8000' to 3500'. One complete pattern takes 4 minutes, which would equate to a descent of over 1000 fpm were the pilot to descend in one pattern. ABC therefore elects to fly two complete patterns, and informs the controller of this (for traffic planning) by saying overhead GG:

A/c: "ABC at GG 8000', request descent, we will be flying two patterns on the descent"
GG: "ABC, noted, descend to 3500', report GG 3500'
A/c: "Descend 3500', report GG, ABC"

When the aircraft has reached 3500' and is again over GG:
A/c: "George, ABC GG 3500'"

GG: "ABC is cleared for the ILS approach runway 29, report turning inbound"
A/c: "Cleared for the ILS approach 29, report turning inbound, ABC"

The aircraft now descends to 2500' on the outbound leg, completes the pre-landing checks, turns inbound level at 2500' below the glideslope, and reports:
A/c: "ABC turning inbound 2500'"
GG: "ABC, report established on the ILS
A/c: "Report established on the ILS, ABC"

When the aircraft has captured localizer and glideslope:
A/c: "ABC established on the ILS"
GG: "ABC report at the outer marker"
A/c: "Report at the outer marker, ABC"

A/c: "ABC outer marker"
GG: "ABC is cleared to land, wind 290/25"
A/c: "Cleared to land, ABC"

For an example of a radar-vectored ILS Approach see chapter 8.10.2.

13.5 SIDS AND STARS

(Ref: AIP RAC 4)

To ensure smoother traffic flow and easier routing for departing or arriving instrument traffic, Standard Instrument Departures (SIDs) and Standard Terminal Arrival Routes (STARs) have been devised. These are predetermined routes from the airport to a navigational aid or other significant point and vice versa. They are published in the AIP and commercial instrument guides, and have their own published communication failure procedures. Their use saves lengthy clearances being issued and therefore makes communications easier and saves time.

The ATIS will mention when SIDs and STARs are in operation. The controller will clear an aircraft for a SID in the After-Departure Clearance: "ABC cleared to Cape Town on the Heidelberg Two Alpha Departure, departure frequency 124.5, squawk 1234". The altitude at which the aircraft must contact Johannesburg Approach is published with the SID, in this case 7000', and is therefore not mentioned specifically. For a STAR the clearance will be given before reaching a significant point on the arrival.

Example: Heidelberg Two Alpha Departure (SID for runway 03 right at Jan Smuts)
Climb straight ahead to 5.5 nm DME JSV, then turn right and home on NDB NL and climb to FL90. At FL90 turn right to HGV. Further climb will be under radar control. Over HGV set course as per flight plan.
Communication failure: Comply with Heidelberg Two Alpha Departure, maintaining last cleared flight level to HGV. Over HGV set course as per Flight Plan and climb to flight plan level.

14. RADIO TECHNICAL

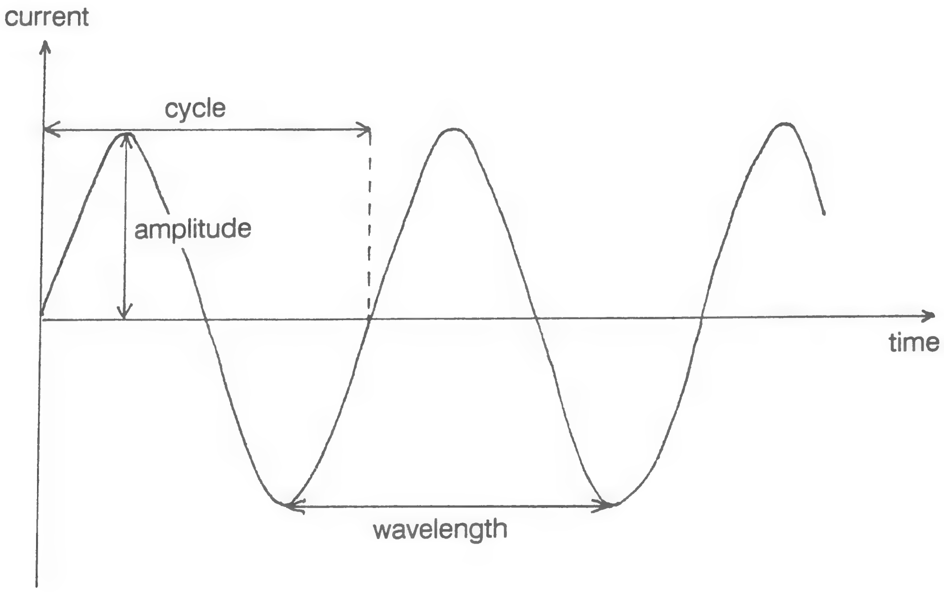
(all of this chapter except 'Battery Care' for General Licence only)

14.1 RADIO WAVES

14.1.1 THEORY

Radio waves (electromagnetic waves) are created by a source of alternating voltage connected to a wire (aerial). This will set up an oscillating electric field in the aerial, which in turn induces a magnetic field. Through this electromagnetic oscillation a wave is propagated through space and can be received by an appropriate receiving aerial.

When a graph of the current constituting the radio wave is plotted against time, the picture of a sine curve will result.



14.1.2 DEFINITIONS

A CYCLE is one complete process from the wave being at the time-axis through one full positive and one full negative amplitude until the wave reaches the time-axis again.

AMPLITUDE is the maximum value from the mean.

FREQUENCY is the number of cycles per second, measured in Hertz.

HERTZ	(Hz)	= 1 cycle per second.
KILOHERTZ	(KHz)	= 1000 Hz
MEGAHERTZ	(MHz)	= 1000 KHZ = 1 million Hz
GIGAHERTZ	(GHz)	= 1000 MHz = 1 million KHz = 1000 million Hz

Since radio waves travel at the speed of light of 300 million metres per second (m/s), a simple relationship exists between wavelength (λ), speed (c) and frequency (f)

$$\text{wavelength } (\lambda) = \frac{\text{speed } (c)}{\text{frequency } (f)} \qquad \text{frequency } (f) = \frac{\text{speed } (c)}{\text{wavelength } (\lambda)}$$

Example: what is the length of a wave with a frequency of 100 MHz?
Answer:

$$\lambda = \frac{c}{f} = \frac{300\ 000\ 000\ m}{100\ 000\ 000\ Hz} = 3 \text{ metres}$$

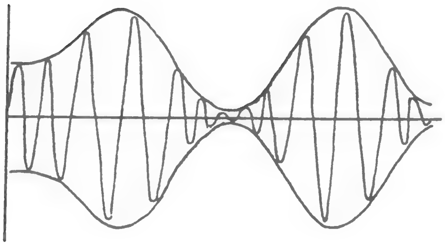
14.1.3 FREQUENCY BANDS

The waves used in aeronautical radio applications vary in length from 1 mm to 100 km and in frequency from 3 KHz to 300 GHz. Different frequencies have different characteristics and are used for varying applications. According to their different behaviour, radio waves are grouped into frequency bands as follows:

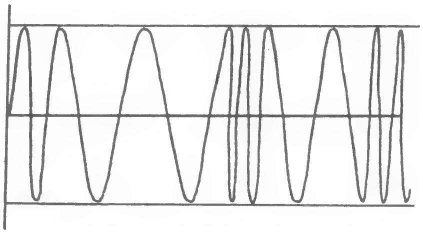
Frequency band		Frequency	Wavelength
Very low frequency	VLF	3 - 30 KHz	100 - 10 km
Low frequency	LF	30 - 300 KHz	10 - 1 km
Medium frequency	MF	300 - 3000 KHz	1000 - 100 m
High frequency	HF	3 - 30 MHz	100 - 10 m
Very high frequency	VHF	30 - 300 MHz	10 - 1 m
Ultra high frequency	UHF	300 - 3000 MHz	100 - 10 cm
Super high frequency	SHF	3 - 30 GHz	10 - 1 cm
Extremely high frequency	EHF	30 - 300 GHz	10 - 1 mm

14.1.4 MODULATION

A plain radio wave (carrier) conveys no information, it can be compared to the blank pages of a book. To imprint information in the form of speech onto it, the carrier wave must be modulated. This can take the form of amplitude modulation (AM) or frequency modulation (FM). In both cases an audio signal is superimposed on the carrier wave, thus modulating either it's amplitude or it's frequency. In addition to AM and FM there is pulse modulation, used in radar, and simple keying, i.e. starting and stopping the carrier wave to produce morse signals.



Amplitude Modulation (AM)



Frequency Modulation (FM)

14.2 WAVE PROPAGATION

14.2.1 DEFINITIONS

Depending on their frequency, waves are propagated in various ways. During their travel, waves are subjected to different phenomena:

ATTENUATION: the loss of energy to the surface or the atmosphere (water vapour, rain etc.), results in the wave losing its strength and finally becoming undetectable.

DIFFRACTION: the bending of radio waves when encountering obstacles. Diffraction is maximum at the lowest end of the spectrum and decreases with an increase in frequency.

FADING: is caused by receiving two or more waves of the same signal with varying phase differences. This could lead to the two signals re-enforcing each other, but also to the cancelling out of the two signals.

INTERFERENCE: results from two transmitters of the same or similar frequencies overlapping, or can be caused by heavy industry or other electric systems creating electric noise.

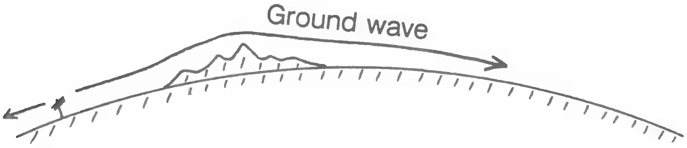
REFLECTION: radio waves are reflected by objects commensurate with their wave lengths.

REFRACTION: the change of direction a wave experiences when travelling from one medium to another one of a different density.

STATIC: is caused by electromagnetic disturbances in the atmosphere, resulting in 'radio noise'. Static is severe in VLF waves, decreases as the frequency increases and becomes negligible in the VHF band.

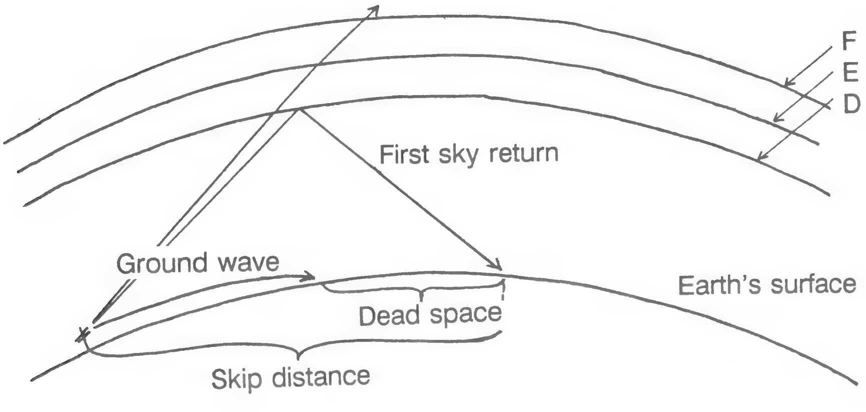
14.2.2 GROUND WAVES

Ground waves or surface waves bend due to diffraction and tilt due to attenuation, and so actually follow the curvature of the earth. Only waves in the VLF to HF band are propagated by surface waves. In higher frequencies surface attenuation becomes stronger and bending becomes less, so that surface waves do not exist anymore.



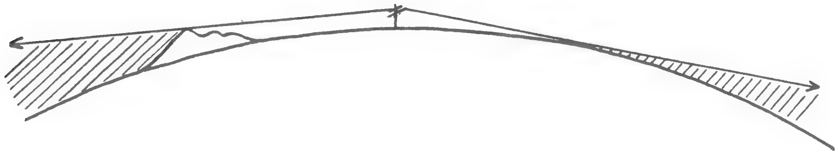
14.2.3 SKY WAVES

Waves in the LF to HF bands are increasingly refracted by ionised layers in the ionosphere above the earth, since the ionised layers are of a different refractive index to the atmosphere. The three ionised layers, D, E (Kennelly-Heaviside) and F (Appleton) vary in height above the surface from 50 to 225 km and move diurnally and seasonally. Depending on the degree of refraction (which varies with the electron density in the layers) and the angle at which the radio wave strikes the layers, these waves may either escape into space or return to earth. The distance from the transmitter at which the first sky wave returns to earth is called SKIP DISTANCE. The area between the last surface wave and the first sky wave is termed DEAD SPACE, and no reception will be possible in that area. Dead space is most noticeable in the HF band, where the surface wave is fairly short and the skip distance relatively high.



14.2.4 DIRECT WAVES

Waves at frequencies from VHF and above, are only propagated as direct waves (and to some extent as ground reflected waves). This type of transmission is called "line-of-sight" transmission and is therefore limited by mountains etc. and by the curvature of the earth.



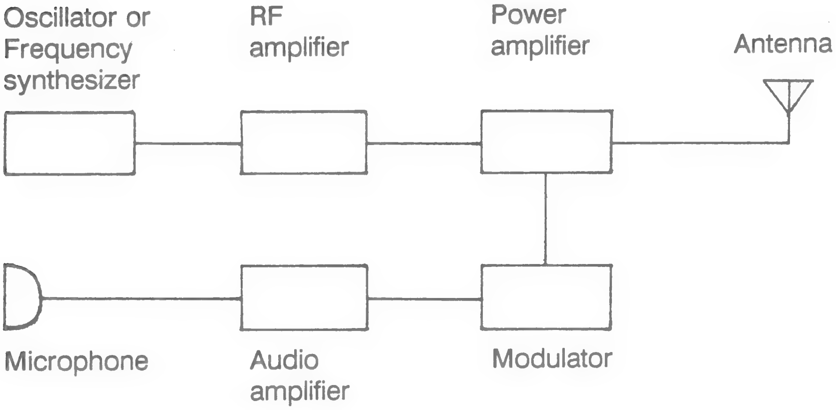
14.2.5 SUMMARY

Band	Propagation	Range	Drawbacks	Used for
VLF	ground wave only	up to 4000 nm	severe static, very large aerials	OMEGA GNS
LF	ground and sky wave by night, ground wave by day	1500 nm	pronounced static, large aerials	DECCA NDB Consol Loran
MF	ground and sky wave by night, ground wave by day	300 to 1000 nm	noticeable static	NDB Consol Loran
HF	sky wave	up to 4000 nm	slight static	Long-distance R/T
VHF	direct wave	line of sight		R/T ILS LOC VOR VDF
UHF	direct wave	line of sight	slight attenuation	ILS GP DME Surveillance Radar
SHF	direct wave	line of sight	increased attenuation	Doppler, Radio altimeter, Airborne weather radar, PAR, Surveillance Radar
EHF	direct wave	line of sight	severe attenuation	Airfield surface radar

14.3 RADIO INSTALLATION IN AIRCRAFT

14.3.1 TRANSMITTERS

To convert speech into radio waves several components are required in an aircraft.



The OSCILLATOR (via crystals) or the more modern FREQUENCY SYNTHESIZER provides the radio carrier wave by creating an alternating current of the appropriate frequency.

The RADIO FREQUENCY (RF) AMPLIFIER amplifies (strengthens) the weak signals produced by the oscillator.

The MICROPHONE converts the sound waves created by speech into weak electromagnetic signals. There are several types of microphones used in aircraft:

- the CARBON MICROPHONE consists of a cup filled with carbon granules. When sound waves hit the diaphragm the resistance between the carbon granules is changed and so induces a changing current, which in turn is fed to the audio frequency amplifier. The carbon microphone is subject to noise generated by changing resistance due to handling the microphone, and it can deteriorate due to the carbon granules packing together.
- The DYNAMIC MICROPHONE uses a coil connected to the diaphragm. The sound waves hitting the coil make it move and thus induce varying currents.
- the ELECTRET MICROPHONE.

Most modern microphones are NOISE-CANCELLING. This means that in addition to the main opening in front of the diaphragm into which the pilot speaks, there is a little hole at the back of the microphone case, through which sound may enter. In a noisy cockpit environment, the overall engine noise will enter through both openings in the microphone and the sound waves will cancel each other out. When the pilot speaks into the microphone, the sound waves entering the mike from the front are much stronger than those entering from the back and the sound waves will be amplified and eventually transmitted. To obtain the best results it is therefore imperative that the microphone is held close to the mouth. Most hand-held microphones have a rim above the diaphragm, which should touch the pilot's upper lip when transmitting.

The AUDIO FREQUENCY (AF) AMPLIFIER amplifies the weak signals fed to it by the microphone.

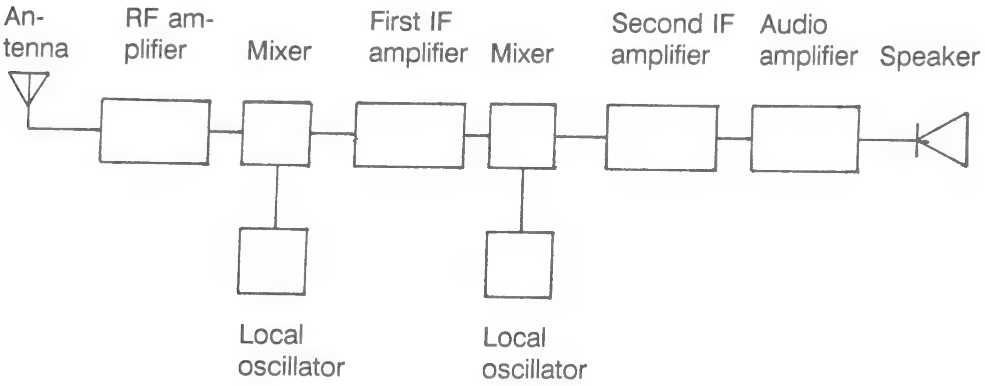
The MODULATOR will receive the inputs from the AF amplifier (the audio signals) and will vary the amplitude (in amplitude modulation AM) of the carrier output at the audio rate.

The POWER AMPLIFIER will further amplify the signal.

The AERIAL receives the modulated and amplified signal from the power amplifier and so sends out the electromagnetic radio wave.

14.3.2 RECEIVERS

The radio waves received by the receiving station have to undergo several stages until they are made audible to the human ear.



The AERIAL will receive very weak signals of varying frequencies. Most modern receivers are able to use a signal input from the antenna in the region of 2 to 3 μV, i.e. 2 to 3 millionths of a Volt.

The RF AMPLIFIER will non-selectively amplify all waves received.

The first LOCAL OSCILLATOR produces a signal 10.7 MHz above the selected frequency to be received. i.e. 128.8 Mhz if frequency 118.1 Mhz was selected on the receiver.

The MIXER receives signals from the RF amplifier and the local oscillator and mixes them, resulting in the impression of the original voice signal onto the frequency of 10.7 Mhz, called the first INTERMEDIATE FREQUENCY (IF). This intermediate frequency is necessary to simplify further stages of amplification.

The first INTERMEDIATE FREQUENCY AMPLIFIER has the task of further amplifying the still weak signal.

The second LOCAL OSCILLATOR produces a crystal frequency at 11.2 MHz.

The second MIXER receives signals from the first IF amplifier at 10.7 MHz and from the second local oscillator at 11.2 MHz and mixes them, resulting in the original speech now being impressed on a frequency of 500 KHz.

The second INTERMEDIATE FREQUENCY AMPLIFIER now amplifies this 500 KHz signal.

The AUDIO AMPLIFIER, finally, amplifies the audio signal and feeds it to ...

the LOUDSPEAKER or HEADPHONES, which work in a similar, but reversed fashion to the microphone.

14.3.3 BATTERIES

14.3.3.1 TYPES OF BATTERIES

A battery is a storage device for electrical energy. While a battery is being charged, electrical energy is converted into chemical energy, which will then be converted back into electrical energy when current is drawn from the battery.

Batteries consist of a number of cells with two plates (positive and negative) and a fluid (electrolyte) in between. The two types of batteries commonly used in light aircraft are Lead-Acid and Nickel-Cadmium (NiCad). Each cell in a Lead-Acid battery usually stores 2 Volts, in a NiCad battery 1.2 Volts. A 12 V Lead-Acid battery therefore consists of 6 cells, a 24 V battery of 12 cells. The Lead-Acid battery has negative lead plates and positive lead dioxide plates with a solution of sulphuric acid and distilled water as an electrolyte. NiCad batteries use positive plates of nickel peroxide and negative plates of iron while the electrolyte is a solution of potassium hydroxide and water.

Batteries in aircraft are used for two purposes. One is to supply current to the starter motor for starting the engine. A small aircraft can easily be started by 'prop swinging' should the battery be flat. If properly done with the necessary safety precautions observed, this is not dangerous, but should only be attempted by pilots having had good dual instruction in the procedure. Every pilot should be aware that the engine might start even when only turning the propeller during the pre-flight inspection. Once the engine is running, current to the spark plugs is supplied by the magnetos which are driven by the engine and need no external electrical power. Therefore, the engine will keep running when the master switch is turned OFF or the generator or alternator fails.

The second purpose of a battery is to supply current to the radios, lights and other electrical equipment. Should the alternator fail in flight, a battery will supply current for anything from 5 minutes to several hours, depending on its state of health and the electrical load. In case of alternator failure, the pilot should switch OFF all unnecessary electrical equipment and conserve power by keeping radio transmissions to a minimum (transmitting draws more current than receiving). Remember that an aircraft may not fly in controlled airspace without two-way radio communications, so an alternator failure might mean that the pilot will have to divert to an unmanned airfield.

14.3.3.2 BATTERY CARE

(applicable to the Restricted and the General Radio Licence)

1. No smoking or open fires near the battery (batteries give off highly inflammable fumes).
2. Check for moisture on the floor of the battery housing (this could mean leaking electrolyte and therefore decreased battery efficiency).
3. Check for cracks in the battery casing (leaking electrolyte).
4. Check terminals are clean and tight (loose or dirty terminals may not make contact).
5. Ensure the terminal attached to the aircraft (ground) is properly secured.
6. Check vents in the filler caps are open.
7. Check plates are not buckled.
8. Check for deposits on the plates.
9. Check the electrolyte covers the plates, but not too full.
10. Check the Specific Gravity of the electrolyte with a hydrometer to make sure it is correct.
11. Check the voltage of the cells with a voltmeter.
12. Ensure that the battery is properly secured in its housing and this to the aircraft.
13. Do not overload the battery by having unnecessary electrics ON when starting.
14. In flight, keep an eye on the ammeter. It is your only way of knowing of an alternator failure before actually running out of electrical power.

14.3.4 ALTERNATORS AND GENERATORS

To recharge the battery in flight and to provide continuous power to the electric equipment in the aircraft, a generator or alternator is fitted to all modern aeroplanes. A drive belt connected to the crankshaft on the one side and the alternator/generator on the other side is usually situated close behind the propeller of light aircraft and should be checked for proper tension during the pre-flight checks.

Most modern aircraft are fitted with alternators, which start charging the battery even when the engine is idling, while a generator will only charge at fairly high RPM settings. The disadvantage of an alternator is that it needs some charge in the battery to excite it before it will start charging the battery, while a generator will charge even a completely flat battery.

15 RADAR

(Ref: AIP RAC 2.5 - 2.9)

RADAR (**RA**dio **D**etection **A**nd **R**anging) is today employed in various applications:

- basic primary radar for detection and ranging of aircraft by the air traffic controller (radar's original task)
- secondary surveillance radar (SSR) for improved detection and ranging as well as altitude reporting
- weather radar for detection of turbulence or precipitation
- distance measuring equipment (DME) to indicate to a pilot the aircraft's distance from a ground station
- navigational assistance in the LORAN navigational system
- groundspeed and drift assessment in the Doppler navigational system
- radio altimeter to give the pilot an accurate indication of the height of the aircraft above ground
- precision approach radar (PAR) as a ground controlled approach aid.

15.1 PRIMARY RADAR

(Ref: AIC RAC 2.5 - 2.7)

This original radar uses the principle of pulse technique to determine the bearing and distance of an object from a station. A narrow beam of radio pulses is sent out by the ground transmitter, usually sweeping horizontally through 360°. The radar pulses are reflected by objects, *e.g.* aircraft, but also by precipitation or mountains. The reflected beam is received by the ground receiver, and from the time the signal takes to return to the receiver the distance of the aircraft from the ground station is computed. The aircraft then appears as a moving 'blip' on the radar screen in the air traffic control room.

Primary radar is a self-contained system, requiring no equipment in the aircraft and no action by the pilot. Its disadvantage is susceptibility to radar clutter from rain or cloud.

At present the only civil airports equipped with primary radar are:

- Bloemfontein, J.B.M. Hertzog
- Cape Town, D.F. Malan
- Durban, Louis Botha
- East London, Ben Schoeman
- Johannesburg, Jan Smuts
- Port Elizabeth, H.F. Verwoerd

In controlled airspace at the above centres radar service will be provided to aircraft operating within radar range to

- separate traffic from each other and from terrain,
- radar vector aircraft where necessary,
- provide information and warning about significant deviations from normal flight path,

- assist aircraft in emergencies,
- give warnings of other aircraft on possible conflicting flight paths,
- give information on observed weather conditions.

A controller will let the pilot know that he has identified the aircraft on his radar screen with the words "ABC, radar identified". From that moment on the aircraft is provided with **Radar Service**, that means the aircraft will be radar monitored, will receive information about other traffic seen on radar, can be helped in an emergency, and can be placed under radar control when necessary.

After an aircraft has been radar identified the controller can place it under **Radar Control** with the words "ABC under radar control". From then on the aircraft will be separated from other traffic and can be radar vectored. When radar control is no longer provided the controller will notify the aircraft in controlled airspace with the words "ABC, radar service terminates". When an aircraft which has been provided with radar control leaves controlled airspace, the radar control will automatically be terminated without the pilot being notified.

As mentioned before, radar service or control can only be provided when the aircraft is within radar range. Since mountainous terrain limits radar coverage, pilots must acquaint themselves with the radar terrain clearance charts published (AIP RAC 4) for the various airfields. These charts show a map of the area around the airport with sectors marked with minimum altitudes. Only aircraft flying at or above the specified altitudes for any particular sector can be detected by radar.

15.2 SECONDARY RADAR

In a secondary radar installation a transmitter (interrogator) transmits a group of pulses which is received by a suitably tuned receiver. If the signals are recognised at the receiver as being meant for it, it will instruct its transmitter (transponder) to reply on a different carrier frequency.

15.2.1 SECONDARY SURVEILLANCE RADAR (SSR)

(Ref: AIP RAC 2.8 - 2.9)

Secondary surveillance radar is slowly augmenting or replacing primary radar as a means of identifying aircraft for air traffic control purposes. The advantages over primary radar are that aircraft can be positively identified with the aircraft's SSR code or call-sign displayed on the radar screen, sometimes together with the aircraft's pressure altitude and its groundspeed.

When a transponder Mode C is installed in the aircraft together with an encoding altimeter, ATC will also be able to see the altitude of the aircraft displayed on the screen. Thus it reduces verbal communication between pilot and controller and helps greatly in traffic separation and traffic flow control.

The latest Mode S transponders answer only when interrogated, so that an air traffic controller can selectively enquire data from specific aircraft, thus reducing clutter on his screen and helping him to resolve traffic conflicts even further. This equipment is as yet not installed anywhere in South Africa.

The ground interrogator sends its group of pulses on a frequency of 1030 MHz and receives on 1090 MHz, while the aircraft's transponder sends on 1090 MHz and receives on 1030 MHz. Thus neither the ground nor the airborne equipment will receive its own reflected signals, thereby eliminating any radar clutter. The aircraft's equipment recognises the mode of interrogation by the time spacing between pairs of interrogating pulses, and it will reply with the code selected by the pilot on the transponder set by the inclusion or omission of any of up to 12 pulses.

When filing a flight plan for a flight to be conducted in controlled airspace equipped with SSR, ATC will assign a specific transponder code to the flight. This code must be selected on the transponder by the pilot. After start-up the pilot should turn the transponder to STANDBY to warm up. The transponder must only be selected ON when entering controlled airspace (i.e. when entering the runway on departure) or when instructed by ATC to do so with the words "Squawk (code)". When several aircraft have been assigned identical codes (*e.g.* 2001 for all VFR flights), the controller may ask a pilot to "squawk ident", after which the pilot should press the IDENT button on his transponder set. This will result in the corresponding 'blip' on the controller's radar screen to fill in, thus enabling him to identify a particular aircraft on his screen. When leaving controlled airspace or when asked to "Squawk standby", the pilot must switch the transponder back to the STANDBY setting. A light on the airborne transponder will flash briefly any time the aircraft's set is interrogated.

Three transponder codes have been assigned internationally for specific purposes. These can be memorised by the mnemonic "ICE":

7500 I = Interference, *e.g.* hijack or other act of violence
7600 C = Communications failure, radio failure
7700 E = Emergency, aircraft emergency

15.2.2 DISTANCE MEASURING EQUIPMENT (DME)

(General Licence only)

DME works on the principles of secondary radar with the airborne equipment being the interrogator and the ground station being the responder. The aircraft's transmitter sends out a continuous series of paired pulses with the time interval between the pairs varied at random. When these pulses are received by a DME ground station, it will reply on a carrier frequency 63 MHz removed from the interrogation frequency. Once the airborne receiver picks up a response from a ground station it locks on and tracking commences.

DME operates in the UHF band in the frequency range of 962 to 1213 MHz. The range of DME is dependant on line-of-sight and reception may not be possible with high ground between aircraft and ground station. Range may be estimated by using the VHF formula of:

$$\text{Range [nm]} = 1.25 * \sqrt{\text{altitude of aircraft - height of transmitter [feet]}}$$

The distances given by DME are slant ranges, not ground distances. Far from a station this 'error' is negligible, but closer to the ground station the inaccuracy is noticeable. An aircraft directly overflying a DME ground station at, say, 12000 feet will show a distance to the station of 12000 / 6080 = 2 nm (1 nm = 6080 feet).

The aircraft's DME equipment consists of a transceiver, an indicator and an aerial. Most DMEs are co-located with VORs and the DME equipment is channelled by the selection on the VOR radio in the aircraft. Alternatively, a separate frequency selector may be available, enabling the pilot to select VOR and DME (TACAN) as required. When a VOR is frequency paired with military TACAN the system is called VORTAC. DME indicators come in varying shapes and sizes, all of them will display slant distance to the station, some have a small computer built in, which can easily calculate and display groundspeed and time to the station at present speed.

16 NAVIGATIONAL AIDS

The following is a brief summary of the types of navigational equipment most likely to be found in training or other fairly simple aircraft. It would exceed the scope of this book to give a full course on the operation of such equipment and the pilot wishing to learn more is advised to consult some of the excellent textbooks on the subject.

16.1 DIRECTION FINDING (DF)

Most controlled airfields have Direction Finding equipment, which works through the normal VHF communications radio. Whenever the pilot presses the microphone button for a few seconds, a readout in the control room or tower will give the magnetic bearing of the aircraft from the station. Since DF works in the VHF band it is limited to line-of-sight and ranges may be assessed by the already mentioned formula for VHF communications.

A pilot uncertain of his position and within range of a DF equipped station may ask for a DF steer, upon which he will be given a QDM (magnetic heading to the station). To account for possible drift, this heading will be updated from time to time. The bearings passed to the pilot may be classified as follows:

- Class A - accurate to within 2 degrees
- Class B - accurate to within 5 degrees
- Class C - accurate to within 10 degrees.

If two or more stations are in range to take simultaneous bearings on the aircraft, the pilot may be provided with a 'fix', that is given his position either in relation to a town or other prominent geographical position or as a bearing and distance from a navigational beacon. Fixes are classified in the following way:

- Class A - accurate to within 5 nm
- Class B - accurate to within 10 nm
- Class C - accurate to within 20 nm.

16.2 AUTOMATIC DIRECTION FINDING (ADF)

Automatic Direction Finding (ADF) works with ground stations called non-directional beacons (NDB) in the medium to low frequency bands from 200 to above 400 KHz. NDBs are marked on aviation charts with a dot surrounded by a dotted circle. They are allocated an identification code of usually two, sometimes three letters, *e.g.* BM for Bethlehem or GG for George, which is transmitted in Morse for identification purposes. The frequencies of individual NDBs are listed in the AIP (Aeronautical Information Publication), commercially obtainable frequency charts and in Appendix I of this book. NDB frequencies are sometimes changed, new ones established or old ones abandoned - these changes will be advised in NOTAMs, which are sent free of charge to all licensed pilots in South Africa. Pilots must always ensure that they have the latest information available.

Since NDBs work in the MF band and rely on propagation by ground and sky waves, reception may be possible even by low flying aircraft separated from the station by high ground. The range of NDBs depends mainly on the power output of the transmitter. Using MF waves leads to several undesirable effects which are mentioned at the end of this chapter.

NDBs may be used:

- as en-route navigation aids, *e.g.* when flying along airways or advisory routes,
- for obtaining position lines (from one NDB) or fixes (if two NDBs are within range),
- as homing devices to the destination,
- as facilities for holding en-route or at destination,
- as let-down aids.

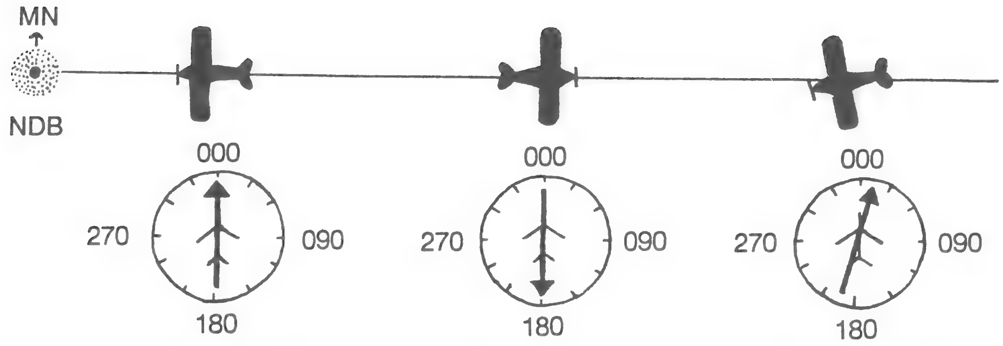
NDBs are received by ADF sets installed in aircraft. The ADF set consists of a panel mounted radio with tuning and volume control knobs, a bearing indicator and a loop and a sensing antenna. The loop antenna is a more or less oval box mounted on the underside of the fuselage while the sensing aerial is a long wire strung usually from the top of the fuselage to the tip of the vertical stabilizer. In modern aircraft the sensing aerial is often flush mounted in the aircraft skin.

16.2.1 BASIC OPERATION

If a pilot wishes to obtain a bearing from an NDB, the ADF must be switched ON and the correct frequency must be selected, *e.g.* 367,5 for NL (New Largo), on the frequency dial. Next, the station must be identified by listening to the identification code letters in morse, *e.g.* NL (– • / • – • •). Since there are normally no warning flags on ADF sets, identification of the station is of utmost importance to ensure that the correct station is received and not either nothing or a more powerful or closer station of a slightly different frequency. Depending on the type of transmission from the beacon and the ADF set in the aircraft, identification must be done with the selector switch in the ADF, REC or BFO position. Next, the indication of the ADF needle should be tested by pressing or turning the TEST control. The needle deflects from and, after releasing the switch, returns to the previous indication.

If everything has been tuned correctly, the needle on the bearing indicator will now point to the station, giving a relative bearing (relative to the aircraft's heading). A bearing or QDR is the magnetic direction from the station to the aircraft, a QDM (the reciprocal of a QDR) is the heading to steer to fly to the station in no wind conditions.

To fly to the station present heading and relative bearing must be added (and, if necessary, 360 subtracted). The result will be the magnetic heading to reach the station.
Example: heading 260, relative bearing 010 = steer 270 to fly to the station.



Heading 270
on QDM of 270
Rel. bearing 000

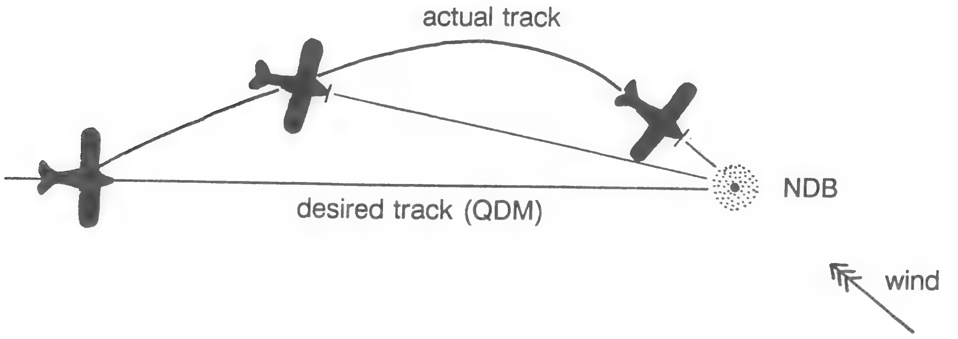
Heading 090
on QDR of 090
Rel. bearing 180

Heading 260
on QDM of 270
Rel. bearing 010

Alternatively, the pilot could turn towards the needle until it points to the top of the ADF indicator, which is a relative bearing of zero.

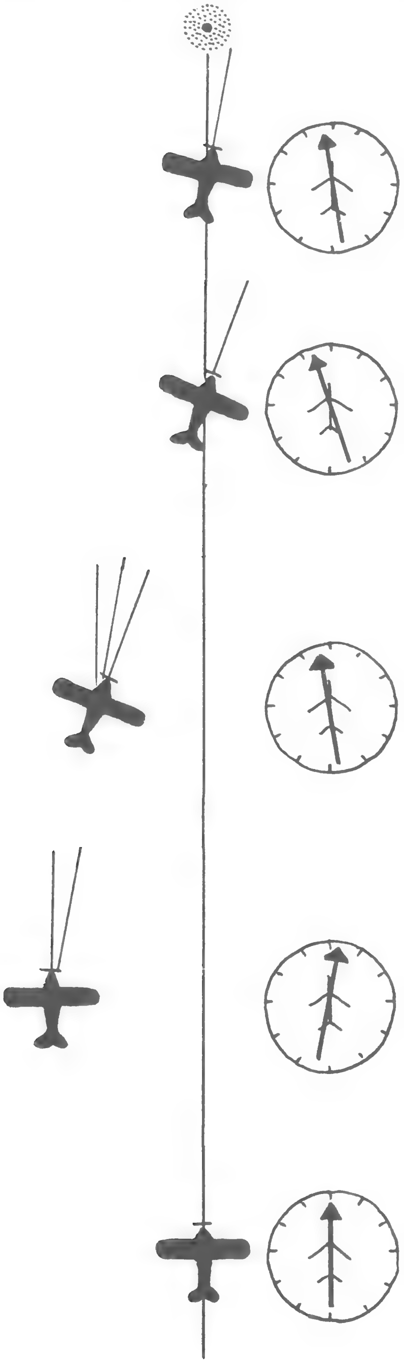
Example: heading 260, relative bearing 010, i.e. needle off to the right by 10° = turn right 10°, giving a new heading of 270. This heading will take the aircraft to the station in no wind conditions.

With any wind except a straight head- or tailwind the aircraft will be blown off track. With the aircraft being drifted off the desired QDM the ADF needle will deflect from the top of the indicator, the pilot will alter heading, the aircraft will be drifted off track again etc. etc. Eventually the aircraft will have flown a curved path to the station, approaching it directly into wind. Apart from this method being untidy it could be dangerous, the curved track leading to decreased minimum separation criteria from high terrain or other traffic.



The correct way to fly is: Centre the needle initially, note the DI (Direction Indicator) heading, this is the desired QDM. Steer this heading with reference to the DI for a few minutes, irrespective of any possible movement of the ADF needle. If after a while the ADF needle has moved off the top centre position, note the number of degrees the needle has deflected from the dead ahead position and turn at least twice that amount towards the needle. As the aircraft progresses further towards the beacon, the needle will 'open up', that is turn away from the top. When the needle points the same number of degrees to one side as you have altered heading from the original QDM to the other side, you are back on your original QDM. You now have to lay off a bit into wind to correct for drift.

Example (read this sketch from bottom to top):



5. Resume original heading (000) PLUS a little bit for wind correction, say 10° right, giving a heading of 010. Find the correct drift correction angle by trial and error, i.e. repeat the procedure if drifted off again.

4. After a while: heading still 020, i.e. 20° right of desired QDM, ADF needle has opened up to 20° left of top = aircraft is back on desired QDM.

3. Correct heading towards the needle by at least double the drift, i.e. turn right 20°. New heading now 020 (20° right of desired QDM). Needle will simultaneously turn to 10° left of top or 350 relative bearing. You will now regain the desired QDM and the ADF needle will turn progressively left.

2. Needle is off 10° to the right, heading still 000, indicating a wind from the right (easterly). Aircraft is 10° to the left of the desired QDM.

1. ADF needle centred, heading 000, therefore desired QDM 000. Steer heading 000 on the DI for several minutes.

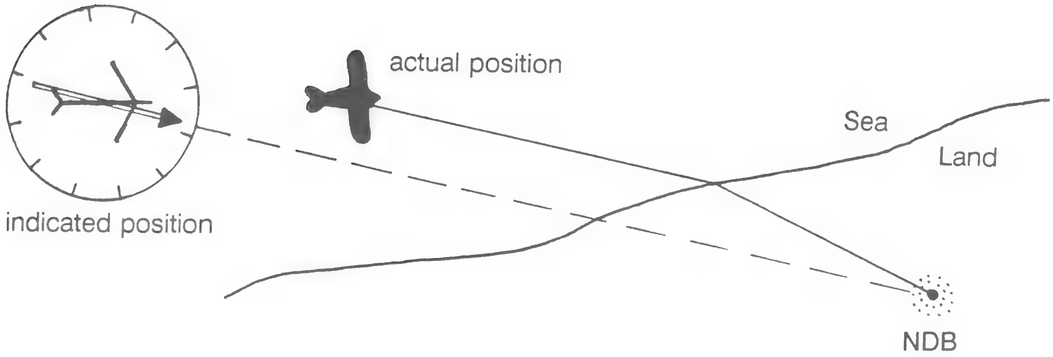
16.2.2 CONDITIONS AFFECTING THE ACCURACY OF THE ADF

1. Mountain effect

Mountains may reflect ADF waves due to diffraction and scattering. The aircraft may receive these signals, which do not come from the direction of the station, giving erroneous indications. This effect is most noticeable at low altitudes.

2. Coastal effect

Due to the higher density of a landmass than a waterbody, waves crossing a coastline at less than 90° will be refracted towards the land, thus indicating a false position.



3. Night effect

MF radio waves are propagated as ground waves only by day and as sky and ground waves by night. Due to the reflected sky waves entering the loop aerial from above and because of possible phase differences between the sky and the ground wave the ADF might give erroneous readings at night. This effect is most disturbing at dusk and dawn due to the movement of the ionised layers at this time. The pilot may notice night effect by excessive oscillations of the ADF needle.

4. Thunderstorm effect

Precipitation and thunderstorms can cause static interference to ADF systems. It is quite common for an ADF needle to point directly to the nearest thundercloud with complete disregard to the position of the station.

16.2.3 OBTAINING A POSITION LINE

If a pilot is unsure of his position, he can obtain a position line from one NDB, or a fix from two NDBs. To do this, he has to select an NDB somewhere close to where he believes he is. While he flies on a constant heading, he should obtain a relative bearing from that NDB as described earlier, and note the time at which this bearing was obtained. To plot a position line on the map, the relative bearing has to be converted to a True bearing from the NDB to the aircraft. This becomes clear with an example:

Example:
A/c heading: 340 (obtained from the DI)
Relative bearing: 130 (from the ADF indicator)
What position line must be plotted on the map?

340 Aircraft heading

+130 Relative bearing

470 If the answer is more than 360°, subtract 360, otherwise ignore this step

-360

110 = Magnetic heading to the station (QDM). Magnetic because the DI shows **magnetic** heading. Since we don't want to fly to that NDB, we don't need a heading **to** the station but the reciprocal: a bearing **from** the station to the aircraft. Therefore:

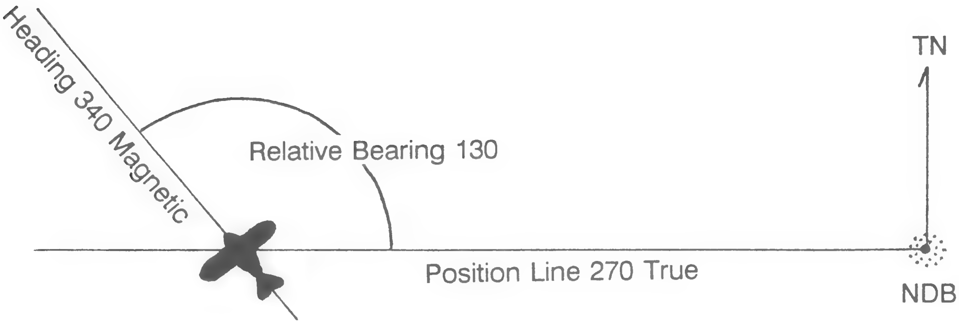
+180 subtract or add 180 to get the reciprocal

290 = Magnetic bearing from the station (QDR). Since the map is orientated with True North at the top, we have to convert Magnetic to True, that means subtracting westerly or adding easterly variation:

-020 subtract 20° westerly variation

270 = True bearing from the station

To plot: draw a line from the NDB in a direction (true) of 270. The aircraft was on that line at the time the pilot took the bearing. In the meantime the aircraft will have moved slightly, but having flown a constant heading and noted the time, the pilot should have a better idea of his whereabouts.



To obtain a fix: If two NDBs or a NDB and a VOR are in range, the pilot should take two bearings, one immediately after the other (note time and heading), then plot both position lines. After allowing for the distance travelled since the fix was obtained, the pilot will know his position with a good degree of accuracy.

16.3 VHF OMNI RANGE (VOR)

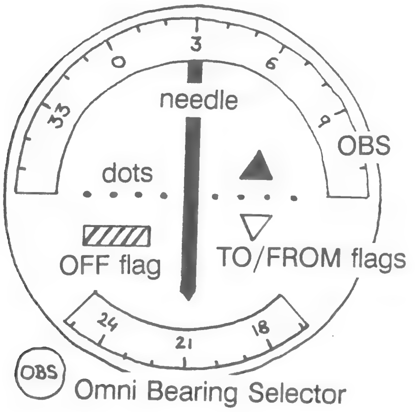
VHF Omni Range (VOR) beacons work in the VHF (Very high frequency) band. They are marked on aviation charts with a compass rose oriented to magnetic north around them. VORs are allocated a three letter identification code, the last letter usually being a V, *e.g.* BLV for the Bloemfontein VOR, frequency 114.1, morse code identification BLV (– • • • / • – • • / • • • –).

A VOR station transmits two signals of alternating phase through 360°. At any point around the VOR station the airborne receiver compares the two signals. Since the phase difference is arranged so that it is 0° at the station's magnetic north, 90° at east, 180° at the station's magnetic south and 270° at west, the VOR receiver in the aircraft can establish the aircraft's bearing from the station. The tracks radiating out from the station are called RADIALs.

VOR beacons transmit in the VHF band between 108 and 118 MHz and are therefore limited to line-of-sight for range. The formula is the same as for VHF communications:

$$\text{Range [nm]} = 1.25\sqrt{\text{height of aircraft above transmitter [ft]}}.$$

The airborne equipment consists of an aerial, a receiver with tuning and volume control knobs and an indicator with an Omni-bearing selector (OBS), a TO/FROM indicator and a left/right deviation indicator. The aerial consists of two small dipoles, usually mounted horizontally on the vertical fin of the aircraft. The receiver control knobs include an on/off switch, sometimes integrated with the volume control and frequency select knobs. When selecting a VOR station the same applies as stated earlier under ADF, i.e. tune and identify the station by its morse code identification.

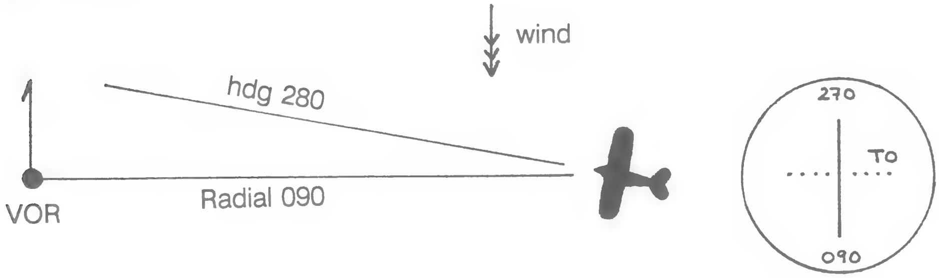


The VOR indicator has an omni bearing scale, rotatable with the OBS knob through 360° , a TO/FROM indication and a needle which can move left or right from a centre position, usually 4 dots either way. 4 dots give a 10° deflection, therefore each dot is equal to a 2° deflection from the middle. An OFF flag can be incorporated into the TO/FROM indication or may be a separate component. The OFF flag will signal that the VOR equipment is not receiving any useable signals.

The needle deflection has to be interpreted as a command, *e.g.* needle left of centre = fly left. In other words, fly towards the needle. The command is given by comparing the heading set in the OBS with the radial on which the aircraft is positioned. It is the pilot's responsibility to have the correct heading selected on the OBS. A pilot not fully conversant with the operation and principles of the VOR will not benefit from the instrument and might even get himself seriously disoriented.

16.3.1 BASIC OPERATION

To fly to a station: turn the OBS until the needle is centred and the TO flag shows. Now the needle should be kept centred by making small corrections to the aircraft's heading left or right as the needle commands. In no wind the heading showing on the DI and on the top of the OBS will be the same. In a wind other than a straight tail- or headwind, the heading flown (on the DI) will vary by the drift correction angle from the OBS heading.



Two simple rules to 'unconfuse' the VOR:

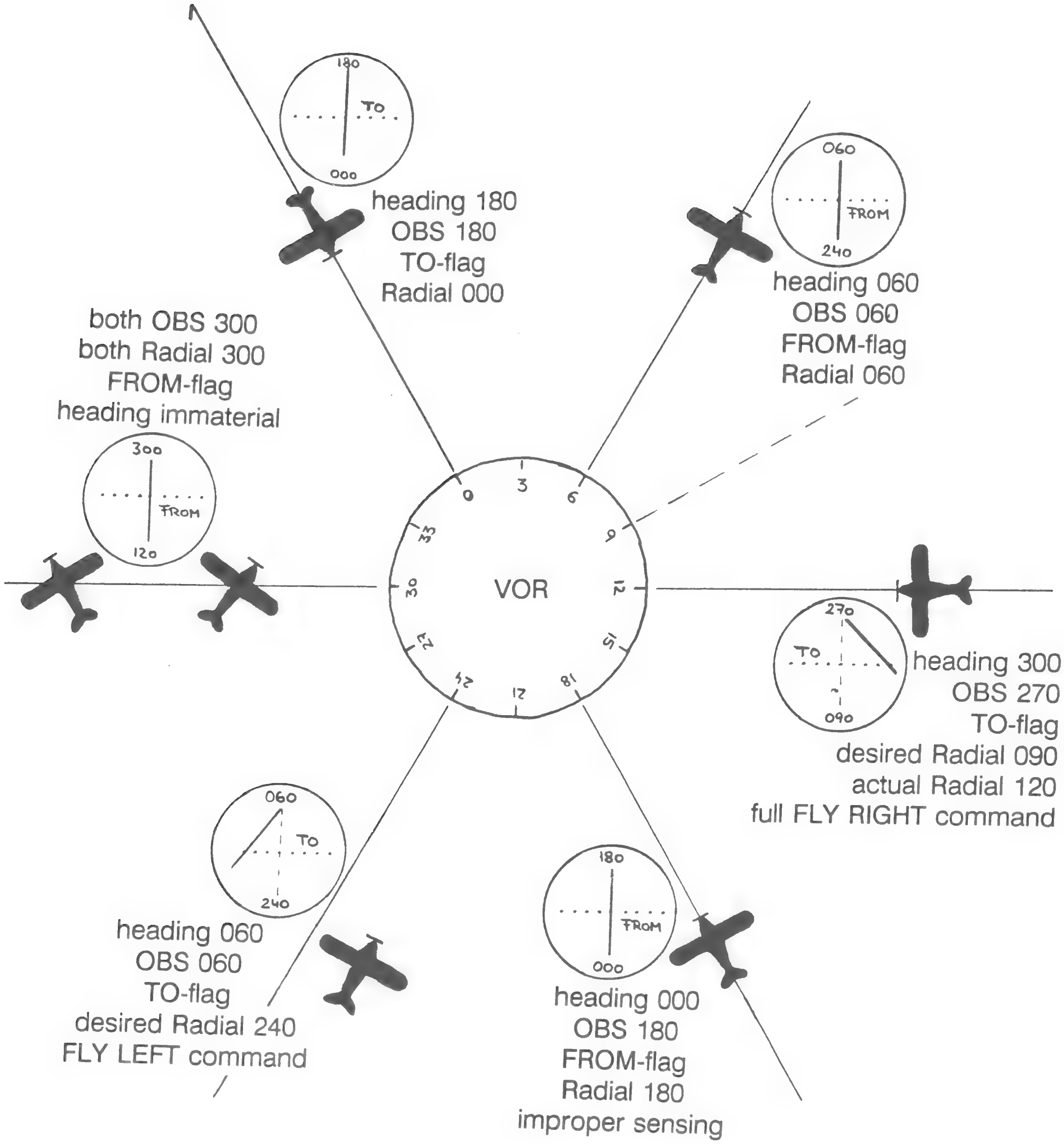
- always have the aircraft's present heading set in the top half of the OBS
- read the RADIAL of the aircraft up top if FROM is showing and at the bottom of the OBS if TO is showing.

See examples on the next page.

16.3.2 OBTAINING A POSITION LINE

To obtain a position line from a VOR is far easier than described for the ADF. Centralising the needle with a FROM indication will give the (magnetic) Radial on which the aircraft is positioned. Since VORs on aviation charts are marked with a compass rose oriented to magnetic north, all the pilot needs to do is plot that Radial on his chart.

VOR EXAMPLES

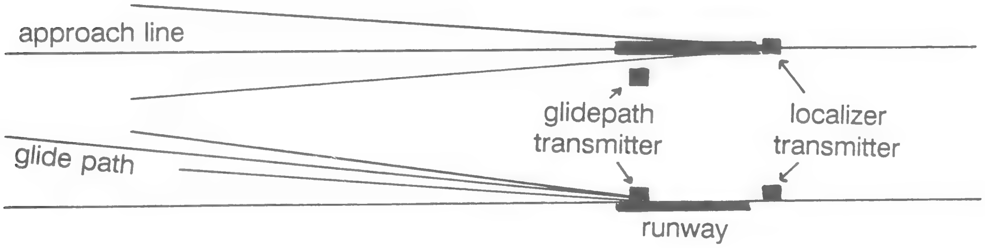


16.4 INSTRUMENT LANDING SYSTEM (ILS)

An Instrument Landing System (ILS) provides the pilot with visual instructions to fly along a predetermined path down to the threshold of a runway and with this supplies the means for a precision approach in IMC.

ILS facilities fall into one of three categories according to their accuracy:
CAT I : accurate to 200 feet above the runway threshold
CAT II : accurate to 50 feet above the runway threshold
CAT III : accurate to the surface of the runway

An ILS transmitter consists of two parts: the localizer, supplying approach guidance in the horizontal plane along the extended centreline of the runway, and the glidepath, which supplies guidance in the vertical plane along a usually about 3° slope towards the beginning of the runway.



The localizer uses one of 20 frequencies in the VHF band from 108 to 112 MHz at odd decimals, *e.g.* 109.1 or 110.3. The glidepath operates in the UHF band on frequencies between 329.3 and 335 MHz with 0.3 MHz spacing. Localizer and glidepath frequencies are always paired, thus eliminating the need to tune two frequencies. The selection of the appropriate localizer for a particular runway will automatically also select the correct glidepath frequency.

The ILS system uses the same indicator as the VOR, providing guidance in azimuth (localizer guidance) via the same vertically mounted needle that the VOR uses. An additional, horizontally mounted needle gives glidepath guidance.

Like the VOR the ILS is a command instrument: if the pilot sees his glidepath needle deflected upward, he is below the glidepath and must fly up to regain the glidepath.

17 THE LIGHTER SIDE OF ATC

(This chapter does not form part of the syllabus!)

A pilot from Jansenville in the Eastern Cape once flew into Cape Town to take part in a navigational rally. Arriving over Sir Lowry's Pass he talked to Cape Town Approach to announce his arrival. Due to traffic he had to be delayed for a few minutes and was asked to orbit over Somerset West. Back came the pilot's reply: "Unable to comply, my aircraft is not certified for aerobatics".

A pilot asked to fly a racecourse pattern, again to keep him away from other traffic, proceeded towards Kenilworth Racecourse.

Another pilot flying a small aircraft from an international airport, wanted to save some time and wished to depart from Echo intersection. When he requested taxi he added: "... and can I have Echo intersection, please". Whereupon Tower replied: "As long as you give it back".

A student pilot requested "Taxi to the General Flying Area". The controller advised him that it would be easier to fly there.

Another student pilot, still a little bit tongue-tied on the radio, said hesitatingly: "Alpha Bravo Charlie, Malan Tower is ready for departure". The controller replied: "I hope not".

A pilot flying a Chieftain on a Red Cross mercy flight was asked by the controller: "Say heading and altitude". Back comes the reply: "Heading and altitude".

Another pilot was asked: "How do you read?" - He replied: "Read you Tener".

A pilot reporting "On top of D", heard from the controller: "I hope she's nice".

Somebody was obviously ready for departure and told the controller with the words: "Request your departure". The controller replied: "I can't leave the Tower right now".

Another pilot giving his estimated time of arrival as: "Estimate yours at 12" was asked: "Where is 'Yours' - I can't find it on my map".

A female student, obviously not quite sure about Flight Levels and Altitudes, reported her vertical position as "Flight Level two five zero zero". A Boeing 737 captain, on the same frequency, drily remarked: "Space Shuttle doesn't take female pilots". (This was a while ago!).

An instructor, wanting to send a not very radio-proficient student pilot solo at a very quiet state airport had heard some transmission by a 'Springbok', but had not quite heard where this aircraft was. She therefore asked the Tower over the radio: "When do you expect that Boeing?" (hoping to send her student solo without the jet being in the circuit at the same time). Before the Tower had a chance to reply, the 'Springbok' captain chips in, quite indignant: "**That** Boeing is an Airbus!".

APPENDIX I - ICAO location indicators and frequencies - October 1992

Pub = Public aerodrome
Priv = Private airfield
Mil = Military aerodrome

P = Parachuting
G = Gliding

* = ATIS (after VOR frequency)
D = DME (after VOR frequency)
L = Locator (after NBD frequency)

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB	VOR	ILS		Telephone/remarks
									Rwy	Frq	
Aberdeen	Pub		FAAE								
Adelaide	Pub		FAAD								
Aggenys	Priv		FAAG					AGV 116.7			122.7 allocated frequency
Alexander Bay	Priv		FAAB	118.7[a]			AB 317.5	ABV 112.1D			MET: 0256-662
Aliwal North	Pub		FAAN								
Alkatpan	Priv										
Arandis	Priv		FAAR				AD 327.5				123.5 allocated frequency
Arnot Power Station	Priv		FAAP								122.2 allocated frequency
Auas			FAAS								
Badshoogte							BH 392				
Bapsfontein	Priv										Microlights only
Barberton	Pub	P	FABN				BT 207.5				
Basaroot/Namibia			FABA								
Beatrix Mine	Priv		FABX								
Beaufort West	Pub		FABW								MET: 0201-4033
Bedford			FABF								
Bethal	Pub		FABH								
Bethanien/Namibia	Priv		FABC								
Bethlehem	Pub		FABM				BM 342.5				
Bisho/Ciskei	Pub		FABE	120.6			BO 417.5	BOV 112.7D	08	110.5	ATC: 04023-3330x216/7 MET: 04023-3330x212/3
Bitterwasser/Namibia	Priv	G	FABJ								
Bizana/Transkei	Priv		FABZ								
Bloemfontein (JBM Hertzog)	Pub		FABL	118.1	124.3	120.3	BL 380	BLV 114.1*D			ATC: 051-331372 MET: 051-331472 Lights: 118.1: 4 clicks on rwy 02/20 5 clicks on rwy 12/30

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[a] AFIS - Alexander Bay Radio

APPENDIX I (continued)

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB		VOR		ILS Rwy	ILS Frq	Telephone/remarks
Bloemfontein (New Tempe)	Pub	PG	FATP				BFT	519					
Bloemhof	Priv	G	FABK										
Bothaville	Pub		FABO										
Brakpan-Benoni	Priv		FABB										
Brandvlei	Pub		FABV										122.7 allocated frequency
Bredasdorp	Pub		FABR										
Brits	Pub		FABS										
Bronkhorstspruit (Mil)							ME	405					
Bultfontein (James Viljoen)	Priv		FABP										
Burgersdorp	Pub		FABD						BDV	113.1			
Butterworth/Transkei			FABU										
Calvinia	Pub		FACV										
Cape Town	Pub		FACT	118.1	119.7	126.5	CT	400	CTV	115.7*D	01	110.3	ATC: 021-9340263
				121.9[a]		125.1[b]	CB	462.5			19	109.1	MET: 021-9340450/8
							CA	282.5L					
Carltonville	Priv	P	FACR										
Carnarvon	Pub		FACN										
Carolina	Pub		FACL				CL	275					
Cathcart			FACC										
Clanwilliam			FACW				CW	372.5					
Clocolan			FACK										
Colesberg	Pub		FACB										
Cookhouse			FACH				CH	402.5					
Copperton			FACO										
Cradock	Pub		FACD										
De Aar (civil)	Pub		FADA										
De Aar (military)	Pub												
Delareyville	Pub		FADL										
Delmas	Pub		FADE										
Dendron	Priv		FADO										

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[a] Surface Movement Control - Malan Ground
[b] Flight Information Service - Cape Town Information

APPENDIX I (continued)

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB		VOR		ILS		Telephone/remarks
											Rwy	Frq	
Devon (Mil)			FADV										
Dordabis/Namibia			FADS										
Dordrecht			FADG										
Douglas Colliery	Priv		FADC										
Dundee	Pub		FADD										
Dunnottar	Mil		FADR	128.8	122.5		DR	470					VDF Dunnottar Homer: 125.6
				133.5									
				121.85[a]									
Durban (Louis Botha)	Pub		FADN	118.7	119.1	120.5[b]	DN	210	DNV	112.5*D	23	110.3	ATC: 031-469005
						119.9[c]	DU	393L					MET: 031-424223/4/5
							RU	235L					
Durban (Virginia)	Pub		FAVG	120.6									ATC: 031-846609
Durnacol			FADH				DH	357.5					
Duwisib/Namibia			FADI										
Dwaalboom	Priv		FADB										
East London	Pub		FAEL	118.3	120.1		EL	410	ELV	114.5*D	10	110.9	ATC: 0431-463863
				122.65[d]			EC	252.5L			28	109.9	MET: 0431-461300
Edenburg			FAED										
Egnep	Priv		FAEG										
Elliot			FAET										
Ellisras/Matimba	Priv		FAER				ER	345	ERV	116.3D			
Empangeni	Priv	P	FAEM										
Ermelo	Pub		FAEO				EO	292					
Eshowe	Pub		FAES				ES	202.5					
Estcourt	Pub	G	FAEC										
Ficksburg	Pub		FAFB				FB	390					
Fisantekraal	Pub		FAFK										
Fort Beaufort	Pub		FAFO										

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[a] Surface Movement Control - Dunnottar Ground
[b] Area Control *and* Flight Information Service above FL125 - Durban Information
[c] Flight Information Service below FL125 - Durban Information
[d] Apron Office - Alpha Oscar

APPENDIX I (continued)

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB		VOR		ILS		Telephone/remarks
											Rwy	Frq	
Fraaiuitzight	Priv												
Frankfort			FAFF										
Fraserburg			FAFR										
George (PW Botha)	Pub		FAGG	118.9	118.9		GG	260	GGV	112.5D	11	109.5	ATC: 0441-769210
							GL	237L			29	110.1	MET: 0441-769219
Giant's Castle Game Reserve	Priv		FAGS										
Gifvlei	Priv		FAGJ										
Giyani	Priv		FAGI				GI	430					
Glen Gray	Priv		FAGH										
Gobabis/Namibia	Pub		FAGB										
Gowrie	Priv		FAGO										
Graaf-Reinet	Pub		FAGR										
Grahamstown	Pub	P	FAGT										123.5 allocated frequency
Grand Central	Pub		FAGC				GC	372.5					122.8 allocated frequency
Grange, The	Priv		FAGA										
Grasmere									GAV	115.5			
Gravelotte	Priv		FAGV				JP	402.5					
Greefswald									GWV	117.9			
Greyton							GE	270					
Greytown			FAGY				GWN	252.5					
Groblersdal	Pub		FAGL										122.4 allocated frequency
Grootfontein/Namibia	Pub		FAGF	123.3			GF	215	GFV	115.7			ATC: 06731-2346
Haakdoornboom	Priv												
Halali/Namibia			FAHI										
Halfweg	Priv												
Harding	Pub		FAHJ										
Harmony	Priv		FAHA										
Harrismith	Pub	G	FAHR				HS	482.5					
Hartebeeshoek							SR	402.5					
Hartebeespoortdam			FAHB				HB	237.5	HBV	112.1			
Heidelberg	Pub		FAHG						HGV	116.7			
Heilbron	Pub		FAHO										
Hendrik Verwoerddam	Priv		FAHV										
Henry's Flats	Priv		FAHF										

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB		VOR		ILS Rwy	ILS Frq	Telephone/remarks
Henties Bay/Namibia			FAHN										
Hermanus	Priv		FAHM										
Hibberdene			FAHH										
Hluhluwe	Pub		FAHL				HL	375					
HMS Bastard Memorial	Pub		FAHU										
Hoedspruit	Priv		FAHT										
Hoedspruit	Mil		FAHS	122.0	126.4		HA	265	HSV	114.0D			VDF Hoedspruit Homer 129.4
				121.7[a]									
Hoopstad	Pub		FAHP										
Hotazel							HZ	257.5					
Howick	Priv	G	FAHC										
Humansdorp			FAHD				HD	320					
Idutywa/Transkei	Pub		FAID										
Indwe	Priv												
Jagersfontein			FAJF				JF	242.5					
Johannesburg (Jan Smuts)	Pub		FAJS	118.1	123.7[b]	126.7[c]	JS	220	JSV	115.2*D	03L	110.3	ATC: 011-9216508
				121.9[d]	124.5[e]	128.3[f]	JB	202			03R	109.1	MET: 011-9755671
				121.7[g]	134.4[h]	119.5[i]	JA	445L			21L	109.9	
				122.65[j]		127.4[k]	JL	250L					
							JN	420L					

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[a] Surface Movement Control - Hoedspruit Ground

[b] Approach Control West sector - Johannesburg Approach West

[c] Johannesburg Area Control North *and* Flight Information Service Springs Corridor from 1800 to 0430 UTC

[d] Surface Movement Control - Jan Smuts Ground

[e] Approach Control Southeast sector - Johannesburg Approach Southwest

[f] Johannesburg Area Control South

[g] Clearance Delivery

[h] Approach Control North sector - Johannesburg Approach North

[i] Johannesburg Information South *and* in Springs Corridor from 0430 to 1800 UTC

[j] Apron Office - Alpha Oscar

[k] Johannesburg Information North

APPENDIX I (continued)

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB		VOR		ILS Rwy	Frq	Telephone/remarks
Johannesburg (Rand)	Pub		FAGM	118.7			RA RD	337.5 307.5					ATC: 011-8274517 MET: 011-8276730
Kakamas			FAKK										
Kamanjab/Namibia	Pub		FAKJ										
Kapteinskop (Mil)							KK	267					
Karasburg/Namibia			FAKB										
Kareedouw			FAKW										
Karibib/Namibia	Pub	G	FAKA										
Keetmanshoop/Namibia	Pub		FAKT	118.3[a]			KT	395	KTV	112.9D			AFIS: 0631-3248 MET: 0631-2248
Kei Mouth	Priv		FAKE										
Kenhardt	Pub		FAKH										
Khorixas/Namibia			FAKX										
Kimberley (BJ Vorster)	Pub		FAKM	123.8	123.8		KM	365	KMV	115.3D			ATC: 0531-511012 MET: 0531-511021 Lights: 123.8: 5 clicks on for 15 mins
Kleinzee	Priv		FAKZ				KZ	212.5					123.5 allocated frequency
Klerksdorp	Pub	P	FAKD				KD	280					123.5 allocated frequency
Koffee Bay			FAKF										
Koffyfontein Mine	Priv		FAKV										
Kokstad			FADM										
Komatipoort	Pub		FAKP										
Komati Power Station	Priv		FAKG										122.2 allocated frequency
Komga	Priv		FAKO										
Kranskop							KA KK	370 300					
Kriel	Priv		FAKL										122.2 allocated frequency
Kroonstad	Pub	G	FAKS				KS	227.5					122.4 allocated frequency
Krugersdorp	Pub		FAKR										122.0 allocated frequency
Kuruman	Pub		FAKU				KUR	352.5					
Ladybrand	Pub		FALB										

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[a] AFIS after hours - Keetmanshoop Radio

APPENDIX I (continued)

Place name		ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB	VOR	ILS Rwy	Frq	Telephone/remarks
Ladysmith	Pub P	FALY				LY 397.5	LYV 116.5			MET: 0361-2411
Lambertsbay		FALM								
Langebaanweg	Mil	FALW	128.8	122.5		LW 345	LWV 117.0*D			ATC: 02286-61710/61901
			120.8			LB 240				VDF Langebaan Homer 123.0
			121.75[a]							
Lanseria	Pub	FALA	124.0	124.0		LA 270	LAV 114.5	06	110.9	ATC: 011-7013262
			121.65[b]			LL 210L				Lights 124.0: 5 clicks on / 7 clicks off
Lichtenburg	Pub	FALI				LG 245				
Lime Acres Finsch Mine	Priv	FALC								123.5 allocated frequency
Loeriesfontein	Pub	FALF								
Lohathla (Mil)		FALH								
Louis Trichardt	Pub	FALO				LO 457.5				Lights: 124.8: 3 clicks on / 7 clicks off
Louis Trichardt	Mil	FALT	119.8	121.2		LS 485	LTV 115.0D			
			121.75[c]			LU 472.5				
Louwater/Namibia	Priv	FALR								
Lüderitz/Namibia	Pub	FALZ								
Lusikisiki/Transkei	Pub	FALK				SI 200				
Lydenburg	Pub	FALL				LD 517.5			110.9	
Majuba Power Station	Priv	FAMJ				MAJ 512.5				122.2 allocated frequency
										Lights: 122.2 3 clicks on
Mala Mala	Priv	FAMD								122.7 allocated frequency
Malelane	Pub	FAMN				TSB 435				
						TSO 450				
Malmesbury	Pub	FAMY								
Manyane Game Lodge	Priv									
Marble Hall	Pub	FAMI								
Margate	Pub	FAMG				MGT 420				122.7 allocated frequency
						MR 485				Lights: 122.7: 7 clicks on
Mariental/Namibia	Pub	FAML								

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[a] Surface Movement Control - Langebaan Ground

[b] Surface Movement Control - Lanseria Ground

[c] Surface Movement Control - Louis Trichardt Ground

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB	VOR	ILS Rwy	ILS Frq	Telephone/remarks
Mariental/Namibia	Pub		FAML								
Mariepskop (Mil)			FAMR			119.0[a] 125.2[b]	MP 297				
Meob Bay/Namibia	Priv										
Messina	Pub		FAMS				MI 335				
Meyerton			FAMT				MT 385				
Mica (Mil)							HP 395				
Middelburg Cape	Pub		FAMC								
Middelburg Transvaal	Pub	G	FAMB								
Mkuze	Priv		FAMU								
Mmabatho/Bophuthatswana	Pub	P	FAMM	119.3	119.3		MM 290L MH 305L	MMV 112.9D	04	110.5	ATC: 0140-21161/2/3/4/5 MET: 014291-21512
Mokuti Lodge/Namibia	Priv										
Mosselbay	Priv	P	FAMO								
Mpacha/Namibia	Priv		FAMP	125.6[c]			KL 332				125.6 allocated frequency
Msauli	Priv		FAMZ								
Namutoni/Namibia	Priv		FANA								
Nelspruit	Pub	G	FANS				NS 480 NT 338	NSV 116.2*D			122.4 allocated frequency
Newcastle	Pub	G	FANC				NC 415 NW 327.5				
New Hanover			FANH				NH 225	NHV 113.5			
New Largo			FANL				NL 367.5				
Ngala	Priv		FANG								
Nieuwoudtville			FANV								
Nylstroom	Pub	P	FANY				NY 465	NVV 116.1			Lights: 124.8: 3 clicks on
Okahandja/Namibia			FAON				ON 320				
Okangwati (Mil)							MK 267				

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[a] Flight Information Service at and below FL105 - Lowveld Information

[b] Flight Information Service above FL105 - Lowveld Information

[c] AFIS - Mpacha Radio

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB		VOR		ILS Rwy	ILS Frq	Telephone/remarks
Okaukuejo/Namibia	Priv		FAOO										
Olifantshoek	Pub		FAOF										
Omega/Namibia			FAOE				ML	533					
Ondangwa/Namibia	Pub		FAOA	125.6[a]			OA	382					
Operet/Namibia	Priv		FAOU										
Oranjemund/Namibia	Priv		FAOG										call Alexander Bay on 118.7
Orient	Priv	G	FAOI										
Ornate							MF	530					
Oshakati/Namibia	Pub		FAOS										
Otavi			FAOV										
Othawa	Priv		FAOL										
Otjiwarongo/Namibia	Pub		FAOW										
Ottosdal	Priv		FAOT										
Oudtshoorn	Pub	P	FAOH				OH	367					
Outjo/Namibia	Pub		FAOJ										
Overberg	Mil		FAOB	129.4	119.8		OB	427.5	OBV	115.4*D			ATC: 02847-59034 (office), 59041 (a/h) 123.5 allocated frequency
Parys	Pub	G	FAPY										
Petrusville	Priv		FAPV										
Phalaborwa (Hendrik van Eck)	Priv	P	FAPH	118.3	118.3		PW	272	PHV	115.3			ATC: 01524-4851(w), 86423(h)
Philippolis	Pub		FAPO										
Pietermaritzburg (Oribi)	Pub	PG	FAPM	122.0			PM	362.5					Lights: 122.0: 5 clicks on
							PU	407					
							PZ	257					
Pietersburg (civil)	Pub	PG	FAPI				PI	425					122.7 allocated frequency
							PT	440					
Pietersburg (military)	Mil		FAPB	128.8 121.85[b]	120.8		PB	410	PBV	117.1D			TWR: 01521-953659 MET: 01521-5720 VDF Pietersburg Homer 129.9
Pietersrus	Priv		FAPW										
Piet Retief	Pub		FAPF										

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[a] AFIS - Ondangwa Radio (to be contacted within a 30 nm radius below FL105)

[b] Surface Movement Control - Pietersburg Ground

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB		VOR		ILS Rwy	Frq	Telephone/remarks
Pilanesberg/Bophuthatswana	Pub	P	FAPN	118.4			PLB	215					
							PLG	480					
Plettenberg Bay	Pub		FAPG				PY	277.5					
Pofadder	Pub		FAPD										
Pomfret	Priv		FAPQ				PF	207.5					
Pongola	Pub		FAPL										
Port Alfred	Pub	P	FAPA	122.0[a]			PA	232.5					
Port Elizabeth (HF Verwoerd)	Pub		FAPE	118.1	119.7	124.7	PE	355	PEV	112.9*D	26	109.5	ATC: 041-513585
							DS	340L			08	111.1	MET: 041-511476/511795
							PD	372.5L					
Port St. Johns/Transkei	Priv		FAPJ				PJ	315					
Postmasburg	Pub		FAPT										
Potchefstroom (Military)	Mil			126.0 121.75[b]	123.0		PF	265	PSV	115.8D			ATC: 0148-25071 VDF Potchefstr. Homer 129.4
Potgietersrus	Pub		FAPP				PR	360					
Pretoria (Wonderboom)	Pub	P	FAWB	120.6	120.6		WB	257.5					ATC: 012-572741
							WR	230					
Prieska	Pub		FAPK										
Prince Albert	Pub		FAPC										
Progress	Priv		FAPZ										122.7 allocated frequency
Pullenshope/Hendrina	Priv		FAHE				HE	400					122.2 allocated frequency
Queenstown	Pub	PG	FAQT										Lights: 125.0: 7 clicks on / 3 clicks off
Ranch Motel (Mil)							PL	382					
Rehoboth/Namibia			FARH										
Reitz	Pub		FARZ										
Reivilo	Pub		FARI										
Richards Bay	Pub		FARB				RB	337					122.4 allocated frequency
							RI	465					
Riversdale	Priv		FARD										

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[a] AFIS - Port Alfred Radio
[b] Surface Movement Control - Potchefstroom Ground

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB	VOR	ILS Rwy Frq	Telephone/remarks
Robertson	Pub		FARS							
Roodeplaat (Mil)							MC 357			
Rooiberg			FARO							
Rooikop	Mil		FARK	122.5 121.75[a]			RK 225	RKV 113.6D		
Rosh Pinah/Namibia			FARP							
Ruacana/Namibia	Priv		FARC				RC 345			
Rundu/Namibia	Priv		FARU				MJ 405			125.0 allocated frequency
Rustenburg	Pub		FARG				RG 452.5			122.4 allocated frequency
Sace	Priv		FASU							
Safari Ranches							SF 277.5			
Saffier	Priv									
Saldanha/Vredenburg	Pub	P	FASD							122.7 allocated frequency Lights: 122.7: 7 clicks on / 3 clicks off
Sani Pass			FASA							
Schweizer Reneke	Pub		FASG							
Seagulls/Transkei			FASQ							
Secunda	Priv	P	FASC				SC 407.5 SU 242.5			122.0 allocated frequency
Senekal	Priv		FASN							
Sir Lowry's Pass			FASP				SP 222.5			
Sishen	Pub		FASS				SS 272.5			123.5 allocated frequency
Siteka	Priv									
Skukuza	Priv		FASZ				SZ 233			123.5 allocated frequency
Slurry	Priv									
Soekor							SKR 217.5 SOE 445			
Solitude	Priv									
Somerset East	Pub		FAST							
Springbok	Pub		FASB							
Springs	Pub		FASI							122.4 allocated frequency

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[a] Surface Movement Control - Rooikop Ground

APPENDIX I (continued)

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB	VOR	ILS Rwy Frq	Telephone/remarks
Standerton	Pub		FASR							
Star	Priv									
Stellenbosch	Priv	P	FASH							
Stormsriver			FASO							
Sutherland			FASL				SL 205	SLV 113.3		
Swakopmund/Namibia	Pub	G	FASM							
Swartkop	Mil		FASK	123.2 121.75[a]						VDF Swartkop Homer 125.7
Swellendam	Pub	G	FASX							
Syferfontein	Priv		FASY							
Tarkastad			FATA							122.6 allocated frequency
Thaba Nchu/Bophuthatswana	Pub		FATN	118.7[b]			TN 282.5			ATC: 05265-2631
Thabazimbi							TB 397.5			
Thohoyandu/Venda	Pub		FATH				THO 325 TOY 285			
Thorny Bush Game Reserve			FATB							
Tommy's Field	Priv		FATF							
Trenneries/Transkei			FATR							
Tristan de Cunha			FATM							
Tshikondeni							TSH 252.5			
Tsumeb/Namibia	Priv	P								
Tsumkwe/Namibia	Priv		FATK							
Tutuka Power Station	Priv		FATT				TU 352.5			122.2 allocated frequency Lights: 122.2: 3 clicks on
Tzaneen	Pub		FATZ				TZ 212.5			
Uis/Namibia			FAUS				US 357.5			
Uitenhage	Pub	PG	FAUH							123.5 allocated frequency
Ulco			FAUC					UCV 114.7		

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[a] Surface Movement Control - Swartkop Ground
[b] AFIS - Thaba Nchu Radio

APPENDIX I (continued)

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB	VOR	ILS Rwy Frq	Telephone/remarks
Ulundi (Prince M. Buthelezi)	Pub		FAUL				UD 267.5			
							UL 422			
							SMH 457.5			
Umtata (KD Matanzima)/Transkei	Pub		FAUT	121.3			UA 227.5			ATC: 0471-360041/2/3/4 or 24441
							UT 335			MET: 0471-2468
Upington (P. van Ryneveld)	Pub		FAUP	121.3	121.3		UN 334	UPV 116.5D		ATC: 054-25831
										MET: 054-22901
										Lights: 121.3: 7 clicks on for 30 mins
Usakos/Namibia			FAUK							
Utrecht	Pub		FAUR							
Vaalhoek							VLH 390			
Vaalputs	Priv		FAVA							
Val							VAL 345			
Vanderbijlpark	Pub	P	FAVP				VP 300			122.3 allocated frequency
Venetia Mine	Priv						VM 417.5			
Ventersdorp			FAVE							
Verborgenfontein	Priv		FAVF							
Vereeniging	Pub		FAVV				VV 460			122.1 allocated frequency
Victoria West	Pub		FAVW				VW 325	VWV 113.7		
Volksrust	Pub		FAVU							
Von Abo's Villa			FAVI							
Vrede			FAVD				VD 322.5			
Vredendal	Priv		FAVR							
Vryburg	Pub	G	FAVB				VB 425			
Vryheid	Pub		FAVY				VHD 230			
							VHL 350			
Walvisbay	Mil		FAWV							
Warden	Pub		FAWD					WDV 114.8		
Warmbaths	Pub		FAWA							

APPENDIX I (continued)

Place name			ICAO Ind.	TWR etc.	APP	Cntrl Info	NDB	VOR	ILS Rwy Frq	Telephone/remarks
Waterkloof	Mil		FAWK	124.1 121.85[b]	134.4[a]		WK 330 WL 315L	WKV 116.9*D		VDF Waterkloof Homer 125.3
Wavecrest/Transkei	Priv		FAWR							
Welkom	Pub	P	FAWM	118.3			WM 435			ATC: 0171-3533918
Wepener			FAWP							
Wesselsbron	Priv		FAWS							
Westerberg Cape Blue Mines			FAWT							
Williston	Pub		FAWL							
Willowmore	Pub		FAWO							
Winburg			FAWN							
Windhoek Airport/Namibia	Pub		FAWH	118.1 121.9[c]	120.5	124.7	WH 280	WHV 114.5D		ATC: 0626-351x261/2 MET: 0626-250
Windhoek (Eros)/Namibia	Pub		FAWE	118.7						ATC: 061-224049 MET: 061-222743 (town)
Witbank	Pub	PG	FAWI					WIV 113.3		123.5 allocated frequency
Wolfkop							WKP 360			
Wolseley			FAWY				WY 247.5			
Worcester	Pub	G	FAWC				WC 335			
Ysterplaat	Mil		FAYP	125.6 121.85[d]						ATC:021-5086151
Zastron			FAZA							
Zeerust	Pub		FAZR							

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[a] Johannesburg Approach North
[b] Surface Movement Control - Waterkloof Ground
[c] Apron Office - Alpha Oscar
[d] Surface Movement Control - Ysterplaat Ground

APPENDIX II - Frequencies to be used at UNMANNED aerodromes

(Ref: NOTAM A058/92)

These frequencies are to be used at UNMANNED AIRFIELDS, where broadcasts are to be made when within 5 nm of the airfield.

122.2 - Arnot
122.7 - Aggeneys
123.5 - Arandis
122.7 - Brakpan
123.5 - Grahamstown
122.8 - Grand Central
122.4 - Groblersdal
123.5 - Kleinsee
123.5 - Klerksdorp
122.2 - Komati
122.2 - Kriel
122.4 - Kroonstad
122.0 - Krugersdorp
123.5 - Lime Acres
122.7 - Mala Mala
122.2 - Majuba
122.7 - Margate
118.7 - Oranjemund (call Alexander Bay)
123.5 - Parys
122.7 - Pietersburg (civil)
122.7 - Progress
122.2 - Pullenshope/Hendrina
122.4 - Richardsbay
122.4 - Rustenburg
122.7 - Saldanha-Vredenburg
122.0 - Secunda
123.5 - Sishen
123.5 - Skukuza
122.4 - Springs
122.6 - Syferfontein
122.2 - Tutuka
123.5 - Uitenhage
122.3 - Vanderbijlpark
122.1 - Vereeniging
123.5 - Witbank

124.4 - all airfields situated within General Flying Areas

124.8 - all other airfields in Namibia and South Africa

130.35 - general 'chat' frequency

APPENDIX III - Frequencies of FLIGHT INFORMATION SERVICE

(Ref: AIP COM 2)

The following gives a list of frequencies for FLIGHT INFORMATION SERVICE. These are to be used in uncontrolled airspace above 1500' AGL. Contact with an ATSU may not always be possible, in which case broadcasts only should be made.

120.3 - BLOEMFONTEIN INFORMATION - Bloemfontein FIR

125.1 - CAPE TOWN INFORMATION - Cape Town FIR

119.9 - DURBAN INFORMATION - Durban FIR (at or below FL125)

120.5 - DURBAN AREA - Durban FIR (above FL125)

126.7 - JOHANNESBURG INFORMATION - in Springs Corridor (between 1800 and 0430 UTC)

127.4 - JOHANNESBURG INFORMATION - Johannesburg FIR (north of a line as in footnote[1])

119.5 - JOHANNESBURG INFORMATION - Johannesburg FIR (south of a line as in footnote[1])
- and in Springs Corridor (between 0430 and 1800 UTC)

119.0 - LOWVELD INFORMATION - Lowveld Military Airspace Sector (at or below FL 105)

125.2 - LOWVELD INFORMATION - Lowveld Military Airspace Sector (above FL 105)

124.7 - PORT ELIZABETH INFORMATION - Port Elizabeth FIR

124.7 - WINDHOEK INFORMATION - Windhoek FIR

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[1] the line dividing Johannesburg Information North and South runs from a point 251600S 254650E (south-east of Alpha and Lobatse) via Olifantsnekdam and LA to JSV, and then via Bethal to a point 265500S 305900E (north-east of Piet Retief).

APPENDIX IV - Marine NDBs

(Ref: AIP COM 2.39/40)

Cape Agulhas	ZUY	298.8
Cape Columbine	ZSZ	305.7
Cape Cross	ZC	305.5
Cape Infanta	ZL	314.5
Cape Point	ZUH	294.2
Cape Recife	ZTY	308.0
Cape St. Blaize	ZRF	291.9
Cape St. Francis	ZUM	303.0
Cape St. Lucia	ZUQ	313.5
Cape Vidal	ZP	300.0
Cooper	ZUT	305.7
Danger Point	ZDP	285.5
Dassen Island	ZUL	314.5
Dias Point	ZRT	303.0
Doringbay	ZS	285.5
Great Fish Point	ZM	297.0
Groenriviermond	ZR	312.0
Hood Point	ZSY	289.6
Ifafa Beach	ZN	310.0
Mbashe (Bashee) Point	ZRE	301.1
Möwe Point	ZUK	305.0
Pelican Point	ZUV	310.3
Port Nolloth	ZUX	291.9
Port Shepstone	ZDT	294.2
Richards Bay	ZK	285.5
Robben Island	ZUI	310.3
Sodwana Bay	ZQ	304.0
Swakopmund	ZUA	289.6
Terrace Bay	ZA	313.5
Toscanini	ZB	295.0

APPENDIX V - **some** ICAO aircraft type designators of popular aircraft

(Ref: ICAO Doc 8643/22 of February 1992 or later)

Aeronca Champion	AR58
Aerospatiale-BAC Concorde	CONC
Aerospatiale Socata Rallye 180T/180T-D/180TS	S890
Aerospatiale Socata Rallye 235	S235
Aerospatiale Tampico TB-9	TB09
Aerospatiale Tobago TB-10	TB10
Aerospatiale Trinidad TB-20	TB20
Aerospatiale Trinidad TB-21	TB21
Airbus A300	EA30
Airbus A310	EA31
Airbus A320	EA32
Avions de Transport Regional ATR42	AT42
Avions de Transport Regional ATR72	AT72
Beech Baron 55	BE55
Beech Baron 58/58TC	BE58
Beech Bonanza/Debonair 33	BE33
Beech Bonanza 35 (V-tail)	BE35
Beech Bonanza 36	BE36
Beech Duchess 76	BE76
Beech Duke 60	BE60
Beech King Air C90, E90	BE90
Beech King Air 100A	BE10
Beech King Air 100B	BE1B
Beech Model 1900 Airliner, 1900C, 1900 Executive	BE02
Beech Staggerwing	BE17
Beech Sundowner 23/Musketeer 23	BE23
Beech Super King Air 200/Huron	BE20
Beech Super King Air 200 HDC	BE2H
Beech Super King Air 300	BE30
Beech Super King Air 300 LW	BE3L
Beech Super King Air 350	BE3B
Bell Jet Ranger/Long Ranger/Sea Ranger	BH06
Bellanca Citabria	CH10
Bellanca Decathlon	BL30
Boeing 707	B707
Boeing 727	B727
Boeing 737-100/200 series	B737
Boeing 737-300/500 series	B73S
Boeing 737-400	B73F
Boeing 747 SP	B74S
Boeing 747-100/200/300 series	B747
Boeing 747-400	B74F
British Aerospace HS 125 Dominie, all series	HS25

APPENDIX V - some ICAO aircraft type designators (continued)

Canadair Challenger CL600/601	CL60
Cessna Caravan I	C208
Cessna 177 Cardinal	C177
Cessna Centurion/Turbo Centurion 210	C210
Cessna 150	C150
Cessna 152	C152
Cessna 310/T310	C310
Cessna 401	C401
Cessna 402/402C/Businessliner/Utililiner	C402
Cessna 411	C411
Cessna Chancellor 414A	C414
Cessna Citation	C500
Cessna Citation I/SP	C501
Cessna Citation II	C550
Cessna Citation II/SP	C551
Cessna Citation III	C650
Cessna Citation V	C560
Cessna Conquest/Conquest II	C441
Cessna Golden Eagle 421	C421
Cessna 172 Skyhawk/Cutlass 172RG	C172
Cessna 182/RG, Turbo Skylane/RG	C182
Cessna 175/Skylark	C175
Cessna Skymaster	C336
Cessna Skywagon 185	C185
Cessna Stationair/Turbo, Stationair 7/8	C207
Cessna Super Skymaster	C337
Cessna Super Skywagon/Stationair/Turbo, Stationair 6	C206
Cessna Titan	C404
Christen Industries Model A-1 Huskey	CIA1
Dassault-Breguet Falcon 10	DA10
Dassault-Breguet Falcon 20FJF/20C/20D/20E/20F	DA20
Dassault-Breguet Falcon 20G/20GF, Mystere Falcon 200	DA21
Dassault-Breguet Falcon 50	DA50
Dassault-Breguet Falcon 900	DA90
De Havilland Beaver DHC-2	DH2
De Havilland Tiger Moth 82A	DH82
De Havilland Rapide 89	HS8
Dornier 228-100/200	D228
Douglas DC3/Dakota/Skytrain	DC3
Embraer Bandeirante EMB-110/A/B/B1/C/E/F/P/P1/P2/K1/S/S1	E110
Embraer Bandeirante EMB-111/A/AS/MS	E111
Embraer Brasilia EMB-120/HH/RT	E120
Fokker Fellowship F28	FK28
Fokker 100	FK10
Fokker 50	FK50
Fokker Friendship F27	FK27

APPENDIX V - some ICAO aircraft type designators (continued)

Gates Learjet 23	LR23
Gates Learjet 24	LR24
Gates Learjet 35	LR35
Grob G109/109B	GR09
Grumman American Trainer/Yankee	AA1
Grumman American Traveller/Tiger/Cheetah	AA5
Hamilton Aviation Westwind III	WSW
Junkers JU 52/3M	JU52
Mooney Mark 20	MO20
Mooney Mark 21	MO21
Mooney Mark 22	MO22
Mooney 201	MO2J
Mooney 231	MO2K
Partenavia P68B/P68C-TC, Victor/P68, Observer/P68R	PN68
Piper Apache	PA23
Piper Aztec	PAZT
Piper Cherokee/Warrior/Archer II/Dakota/Pillan	PA28
Piper Cherokee Arrow IV	PARO
Piper Cherokee Six/Lance/Saratoga	PA32
Piper Cheyenne I/II	PAYE
Piper Cheyenne III/IV	PA42
Piper Cheyenne 400	PA41
Piper Navajo/Chieftain/Mojave/T1020	PA31
Piper Single Comanche	PA24
Piper Cruiser	PA5
Piper Cub Special	PA11
Piper Malibu	PA46
Piper Pawnee	PA25
Piper Seneca II	PASE
Piper Seneca III PA34-220T	PA34
Piper Super Cub	PA18
Piper Tomahawk	PA38
Piper Colt/Tripacer	PA22
Piper Twin Comanche	PA30
Pitts S-1/D/E/S/T Special	CI1
Pitts S-2/A/B/S	CI2
Robin HR 200/120, 200/120B	HR22
Robinson Helicopter R22	RH22
Rockwell Aero Commander 112	AC12
Rockwell Commander 112A	AC2A
Rockwell Commander 112TC	AC2T
Rockwell Commander 114	AC14
Rockwell Jet Prop 690	AC69
Rockwell Jet Commander 840/980/1000	AC84
Rutan Aircraft Vari EZE/Long EZ	VZ10

The Pilot's Radio Handbook
(3^{rd} edition)
SEPTEMBER 1993 UPDATE

p. 7: change R22 to R25 in fourth paragraph

p. 8: NOTAMs class II superceded by AIP SUP (AIP Supplement Service), issued monthly (AIC 10.1/15.11.92)

p. 12/13: change FAWH to FYWH

p. 15: paragraph 1.1.1 add: "some ATZs in Namibia (Grootfontein, Keetmanshoop, Mpacha, Ondangwa, Swakopmund) are class G airspace" (AIP July 93)

p. 18: ERRATA: paragraph 1.2: 4th line class G airspace

p. 19: ERRATA: ATAs and Information Routes are class G airspace. Paragraph 1.2.5 Flying Training Areas must be a sub-paragraph to 1.2.6 Danger Areas (NOTAM A1049/31.12.92) and are class G airspace.

p. 20: ERRATA: FADs, FARs and FAPs are class G airspace.

p. 26: First paragraph: aeroplanes may also enter an ATZ or ATA when the ceiling is at least 500' and radio contact is maintained.
Example 2: it is also legal to arrive at Rand.
Below helicopter table, add: A helicopter may hover in ground-effect or hover-taxi if the visibility is 100 m or better. (Government Notice R515 of 26.2.93).

p. 31: Transition altitudes: change Giyani to 5500', Ulundi to 7100'. Add: Ellisras 7000', Lichtenburg 8000', Majuba Power Station 8000', Malelane 7500', Nelspruit 9000', Pilanesberg 7400', Pullenshope Hendrina 8000', Thaba Nchu 7500', Tutuka Power Station 8000', Venetia Mine 7000', Vereeniging 8000' (AIC 20.2/15.7.93)

p. 44: Item 18 add "RIF/ = Route details to revised destination followed by ICAO designator of destination. The revised route is subject to reclearance in flight" (AIC 42.1/15.7.93)

p. 61ff: On initial contact with any Ground, Tower or Approach controller the aircraft call-sign must be followed by the wake turbulence category, e.g. "Smuts Tower, ABC Light" (AIC 42.1/15.7.93). If the pilot has received an ATIS broadcast he must state on his first message to ATC "Received Information n" where 'n' is the alphabetic code of that ATIS broadcast (AIP July 93).

p. 93: Paragraph 12.1.1: replace "Springs Corridor" with "Jan Smuts Special Rules Area" (NOTAM A472,A473/27.5.93)

p. 94: Diagram: Lanseria TMA upper limit 7600' ALT (NOTAM A070/92) - Johannesburg GFA (FAD 182) moved south and made smaller. Upper limit outside Johannesburg TMA now FL100 (NOTAM B131/92) - Delete FAR73, Dunnottar CTR and ATZ (NOTAM B145/92) - Upper limit Waterkloof TMA now FL460 (NOTAM A289/17.3.93) - Delete 2 Brakpan GFAs (NOTAM A452/25.5.93) - Delete Springs Corridor (NOTAM A472/27.5.93) - Add new East Rand Flying Training Area FAD185: Nigel along R42 north-east, then along R29 east to Devon, then west along road back to Nigel, GND to 7600' ALT (NOTAM A453/25.5.93)

p. 95: 12.1.4 Rand Airport: rwy 18/36 is now 17/35 (NOTAM B294/24.5.93). Delete paragraph 12.1.6 and 12.1.6.1, replace with paragraph: "12.1.6 JAN SMUTS SPECIAL RULES AREA (Ref. NOTAM A473/27.5.93) Aircraft operating east of the R26 (road between Alberton and Vereeniging) and within 3 nm of the Jan Smuts CTR must communicate with Jan Smuts on 119.5. Aircraft in the Springs circuit are excluded from this rule."

p. 96: Diagram: Delete FADR CTR and FAR73 (NOTAM B145/92) and Springs Corridor (NOTAM A472/27.5.93) - Add East Rand Flying Training Area FAD185 and Jan Smuts Special Rules Area (NOTAMs A453,A473/27.5.93)

p. 97: Delete first two paragraphs of 12.1.6.2, replace with: "VFR flights leaving or arriving at Brakpan/Benoni must fly within the segment of the Jan Smuts CTR bounded by straight lines between the Ergo Slimes Dam, Brakpan/Benoni and the Jan Smuts Dam, at or below 6000' ALT." (NOTAM A474/27.5.93)

p. 104: Procedure Turn: may be done ... when approaching the fix from within 30° either side of outbound track (AIP SUP S002/93)

p. 105: Visual Approach: the pilot must have the aerodrome in sight when requesting a visual approach (AIP SUP S002/93)

p. 134: Arandis, Auas, Basaroot, Bethanien, Bitterwasser FY.. (AIP May 93)
Add airfield Bagani FYBG (AIP July 93)

p. 135: Cathcart: add G for gliding (AIC 17.2/15.12.92)
Cradock unlicenced (NOTAM C114/30.3.93)

p. 136: Douglas Colliery unlicensed (NOTAM C202/16.6.93)
East London add ATIS 117.0 (AIP May 93)
Egnep unlicenced (NOTAM C100/8.3.93)
Estcourt allocated frequency 125.4 (AIP SUP S011/5.93)
Add aerodrome Evander, private (NOTAM B141/92)

p. 137: Glen Gray unlicenced (NOTAM C434/15.12.92)
Gobabis FYGB (AIP May 93)
Grootfontein: add footnote: Grootfontein Radio, change ATC to AFIS (AIP SUP S003/Feb. 93), FYGF (AIP May 93)
Halali FYHI (AIP May 93)

p. 138: Henties Bay FYHN (AIP May 93)
Howick allocated frequency 123.4 (AIP SUP S011/5.93)
Jan Smuts add ATIS 116.1 (AIP May 93)
Footnote c delete "and Flight Information Service Springs Corridor from 1800 to 0430 UTC" (NOTAM A472/27.5.93)
Footnote i replace "Springs Corridor" with "Jan Smuts Special Rules Area", delete "from 0430 to 1800 UTC" (NOTAMs A472,473/27.5.93)
Add footnote l: "For dividing line between Area Control and FIS North/South see Appendix III" (NOTAMs A431,463/May 93)

p. 139: Rand airport: add VOR/DME RAV 117.7 (NOTAM A188/15.2.93), add NDB RDW 287.5 (NOTAM B406/20.7.93)
Kamanjab, Karasburg, Karibib all FY.. (AIP May 93)
Keetmanshoop footnote a): delete 'after hours' (NOTAM A077/92),

FYKT (AIP May 93)
Khorixas FYKX (AIP May 93)

p. 140: Langebaanweg new telephone numbers: 02286-52259 or 52123
Lanseria ATC tel: 011-7013505/3262 (AIP APR93)
Louwater, Lüderitz now FY.. (AIP May 93)
Malmesbury unlicenced (NOTAM C227/17.7.92)
Add Maltahöhe FYMH (AIP May 93)
Mariental now FYML (AIP May 93)

p. 141: Meob Bay location indicator FYMB (AIP July 93)
Mkuze unlicenced (NOTAM C155/26.5.92)
Mmabatho ATC tel: 0140-851140-5 (AIP Oct 92)
Mokuti Lodge location indicator FYMO (AIP July 93)
Add Montrose FAMV (AIP May 93)
Mpacha, Namutoni now FY.. (AIP May 93)
Nelspruit: change allocated frequency to AFIS Nelspruit Radio
Add Odi FAIO plus gliding (NOTAM C194/2.6.93)
Okahandja now FYON (AIP May 93)
Add Okakarara, Namibia FYOE (AIP May 93)

p. 142: Okaukuejo, Omega, Ondangwa, Operet now FY.. (AIP May 93)
Add Opuwa, Namibia FYOO (AIP May 93)
Oranjemund now FYOG (AIP May 93)
Orient allocated frequency 123.4 (AIP SUP S011/5.93)
Oshakati, Otavi, Otjiwarongo now FY.. (AIP May 93)
Ottosdal unlicenced (NOTAM C022/21.1.93)
Outjo, Namibia now FYOJ (AIP May 93)
Pietermaritzburg: delete gliding (AIC 17.2/15.12.92)
Pietersburg (military): delete frequencies 128.8, 121.85, 120.8, 129.9, both telephone numbers and footnote (NOTAM C016/14.1.93)

p. 143: Pomfret: delete NDB PF (NOTAM C185/28.5.93)
Pongola: add NDB PGL 382.4 (NOTAM B154/17.3.93)
Port Elizabeth add ATIS 117.7 (NOTAM B372/29.6.93)
Potchefstroom: delete (Military); add ICAO Indicator FAPS; delete TWR, SMC, APP and Homer frequencies (NOTAM B135/92, AIP Jan 93)
Rehoboth, Namibia now FYRH (AIP May 93)

p. 144: Rosh Pinah, Ruacana, Rundu now FY.. (AIP May 93)
Secunda: add ATIS on 121.0, MET: 0136-312078 (NOTAM C184/27.5.93)
Solitude unlicenced (NOTAM C226/1.7.93)

p. 145: Swakopmund: add AFIS 126.3 (AIP SUP S008/4.93), FYSM (AIP May 93)
Uis/Namibia: add G - gliding (AIC 17.2/15.12.92)
Swellendam: add VOR SWV 114.4 (NOTAM C188/12.6.92)
Syferfontein now called Baragwanath (AIP July 93)
Thabazimbi: add ICAO indicator FATI (NOTAM C030/28.1.93)
Tsumeb: add ICAO indicator FYTK (AIP May 93)
Tsumkwe, Namibia now FYTK (AIP May 93)
Tzaneen: Ops frequency 130.6 for fuel (NOTAM C256/12.8.92)
Uis, Namibia add gliding, change to FYUS (AIP May 93)

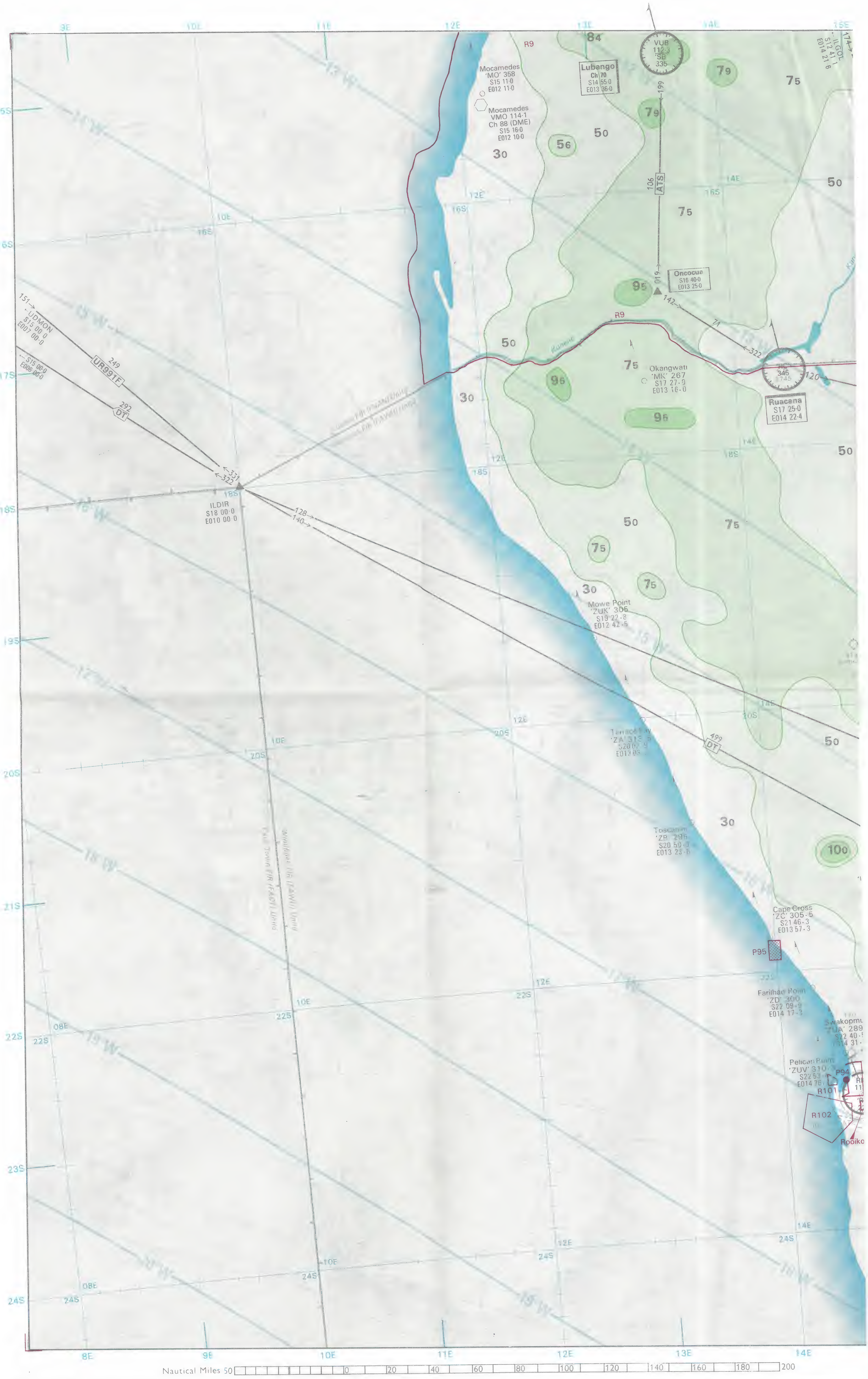
p. 146: Upington ATC tel. 054-311363 (AIP APR93)
Venetia Mine FAVM (AIP May 93)
Vereeniging: Lights: 122.1: 5 clicks on for 15 mins (AIP July 93)
Warden unlicenced (NOTAM C437/21.12.92)

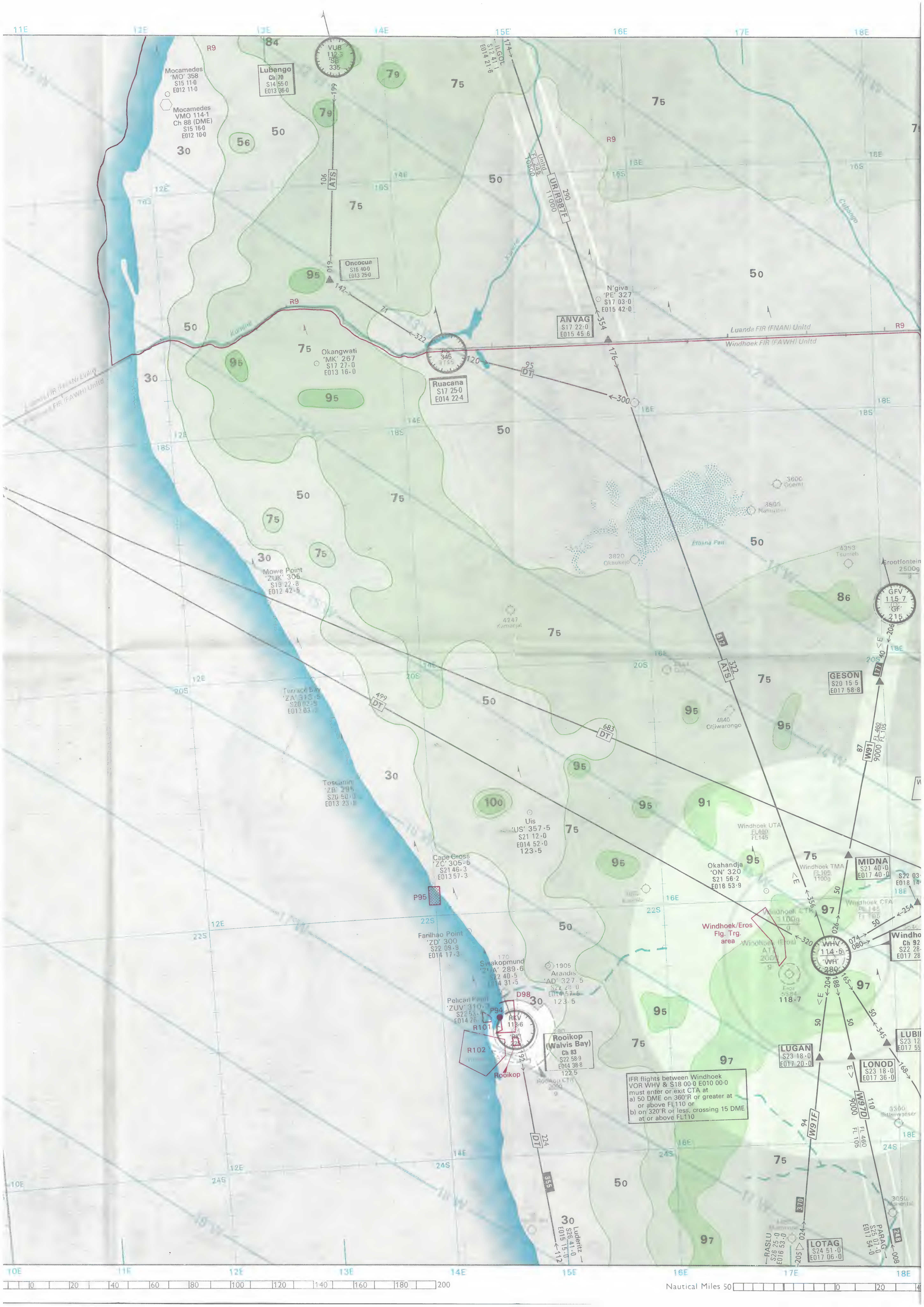
p. 147: Windhoek Airport/Namibia: insert ILS rwy 26 frequency 110.3 (NOTAM

A090/92), now FYWH (AIP May 93), add WD 335L (AIP July 93)
Windhoek Eros now FYWE (AIP May 93)
Witbank: delete G - gliding (AIC 17.2/15.12.92)

p. 148: Add: Estcourt 125.4, Howick 123.4, Orient 123.4 (AIP SUP S011/5.93)

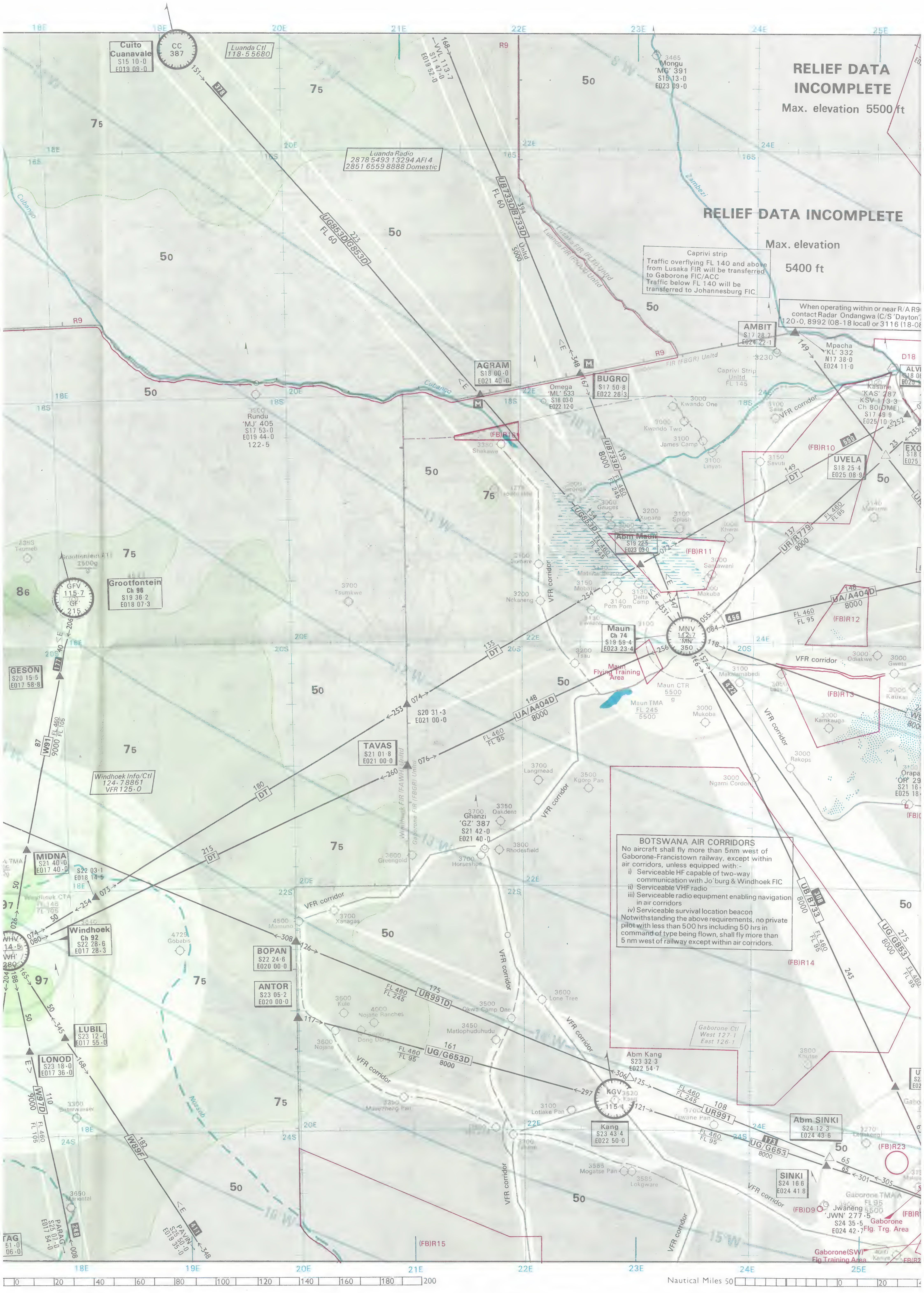
p. 149: For 126.7 delete "in Springs Corridor (between 1800 and 0430 UTC)
For 119.5 substitute "Springs Corridor (between 0430 and 1800 UTC)" with "Jan Smuts Special Rules Area"
Delete footnote 1 and replace with: "the line dividing Johannesburg into a South and North sector runs from 254455S 245915E through 260924S 281353E to 262800S 304750E - representing the same as a line from MMV (Mmabatho) through JSV to VMS (Matsapa) (NOTAMs A431/17.5.93 and A463/26.5.93)


9E
10E
11E
12E
13E
14E
15E
15S
16S
17S
18S
19S
20S
21S
22S
23S
24S
R9
Mocamedes
'MO' 358
S15 11·0
E012 11·0
Mocamedes
VMO 114·1
Ch 88 (DME)
S15 16·0
E012 10·0
Lubango
Ch 70
S14 55·0
E013 36·0
VUB
112·3
'SB'
335
ILGOL
S12 41·1
E014 21·6
174→
199
106
ATS
019
Oncocua
S16 40·0
E013 25·0
142→
71
←322
Kunene
Okangwati
'MK' 267
S17 27·0
E013 16·0
345
120→
Ruacana
S17 25·0
E014 22·4
151→
UDMON
S15 00·0
E007 00·0
S15 00·0
E006 00·0
249
UR991F
292
DT
←331
←322
ILDIR
S18 00·0
E010 00·0
128→
140→
Mowe Point
'ZUK' 305
S19 22·8
E012 42·5
Terrace Bay
'ZA' 313·5
S20 07·9
E013 03
499
DT
Toscanini
'ZB' 295
S20 50·3
E013 23·6
Cape Cross
'ZC' 305·5
S21 46·3
E013 57·3
P95
Farilhao Point
'ZD' 300
S22 09·9
E014 17·3
Swakopmu
'ZUA' 289
S22 40·
E014 31·
Pelican Point
'ZUV' 310·
S22 53·
E014 26·
P94
R101
R102
Rooiko
Windhoek FIR (FAWH) Limit
Cape Town FIR (FACT) Limit
12°W
13°W
14°W
15°W
16°W
17°W
18°W
19°W
84
79
79
75
56
50
30
75
50
95
50
75
96
96
30
50
50
75
75
75
30
50
30
100
8E
9E
10E
11E
12E
13E
14E
Nautical Miles 50
0
20
40
60
80
100
120
140
160
180
200



IFR flights between Windhoek
VOR WHV & S18 00·0 E010 00·0
must enter or exit CTA at
a) 50 DME on 360°R or greater at
or above FL110 or
b) on 320°R or less, crossing 15 DME
at or above FL110

Mocamedes 'MO' 358 S15 11·0 E012 11·0
Mocamedes VMO 114·1 Ch 88 (DME) S15 16·0 E012 10·0
Lubango Ch 70 S14 55·0 E013 36·0
VUB 112·3 'SB' 335
ILGOL S12 41·1 E014 21·6
Oncocua S16 40·0 E013 25·0
N'giva 'PE' 327 S17 03·0 E015 42·0
ANVAG S17 22·0 E015 45·6
Okangwati 'MK' 267 S17 27·0 E013 16·0
Ruacana S17 25·0 E014 22·4
Luanda FIR (FNAN) Unltd
Windhoek FIR (FAWH) Unltd
UR/R987F
ATS
DT
R9
Kunene
Cubango
Etosha Pan
3600 Ooerri
3600 Namutoni
3820 Okaukuejo
4353 Tsumeb
Grootfontein 2500g
GFV 115·7 'GF' 215
4247 Kamanjab
Mowe Point 'ZUK' 305 S19 22·8 E012 42·5
Terrace Bay 'ZA' 313·5 S20 02·5 E013 03·2
Toscanini 'ZB' 295 S20 50·0 E013 23·8
4840 Otjiwarongo
GESON S20 15·5 E017 58·8
W91 FL 460 9000 FL 105
Uis 'US' 357·5 S21 12·0 E014 52·0 123·5
Cape Cross 'ZC' 305·5 S21 46·3 E013 57·3
P95
Farilhao Point 'ZD' 300 S22 09·9 E014 17·3
Swakopmund 'ZOA' 289·6 S22 40·5 E014 31·5
1905 Arandis 'AD' 327·5 S22 28·0 E014 57·5 123·5
Pelican Point 'ZUV' 310 S22 53 E014 26
P94
D98
R101
R102
RKV 113·6
Rooikop (Walvis Bay) Ch 83 S22 58·9 E014 38·8 122·5
Rooikop CTR 2000 9
Rooikop
Okahandja 'ON' 320 S21 56·2 E016 53·9
Windhoek UTA FL460 FL145
Windhoek TMA FL105 1100g
Windhoek CTR 1100g
Windhoek CTA FL 145 FL 105
Windhoek/Eros Flg. Trg. area
Windhoek (Eros) ATZ 2000
Eros 5584 118·7
WHV 114·5 'WH' 280
MIDNA S21 40·0 E017 40·0
LUGAN S23 18·0 E017 20·0
LONOD S23 18·0 E017 36·0
W91F
W97D 110 9000 FL 460 FL 105
3300 Rehoboth
3650 Mariental
RASLU S25 25·0 E016 53·0
LOTAG S24 51·0 E017 06·0
PARAG S25 01·0 E017 54·0
Luderitz S26 41·0 E015 15·0
10E 11E 12E 13E 14E 15E 16E 17E 18E
16S 18S 20S 22S 24S
13°W 14°W 15°W 16°W 17°W 18°W
0 20 40 60 80 100 120 140 160 180 200
Nautical Miles 50 0 20



Caprivi strip
Traffic overflying FL 140 and above from Lusaka FIR will be transferred to Gaborone FIC/ACC
Traffic below FL 140 will be transferred to Johannesburg FIC

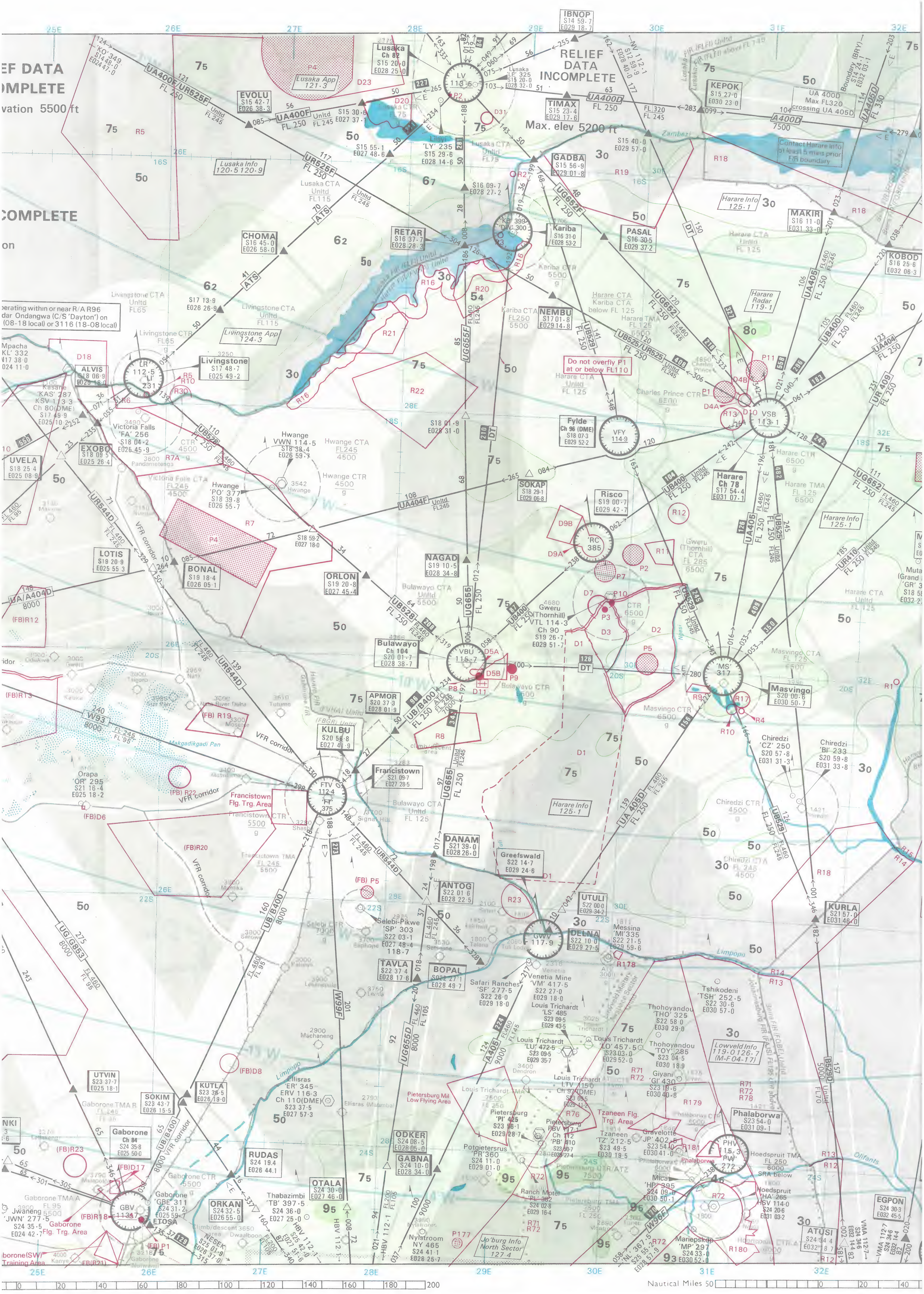
When operating within or near R/A R9
contact Radar Ondangwa (C/S 'Dayton')
120·0, 8992 (08-18 local) or 3116 (18-08

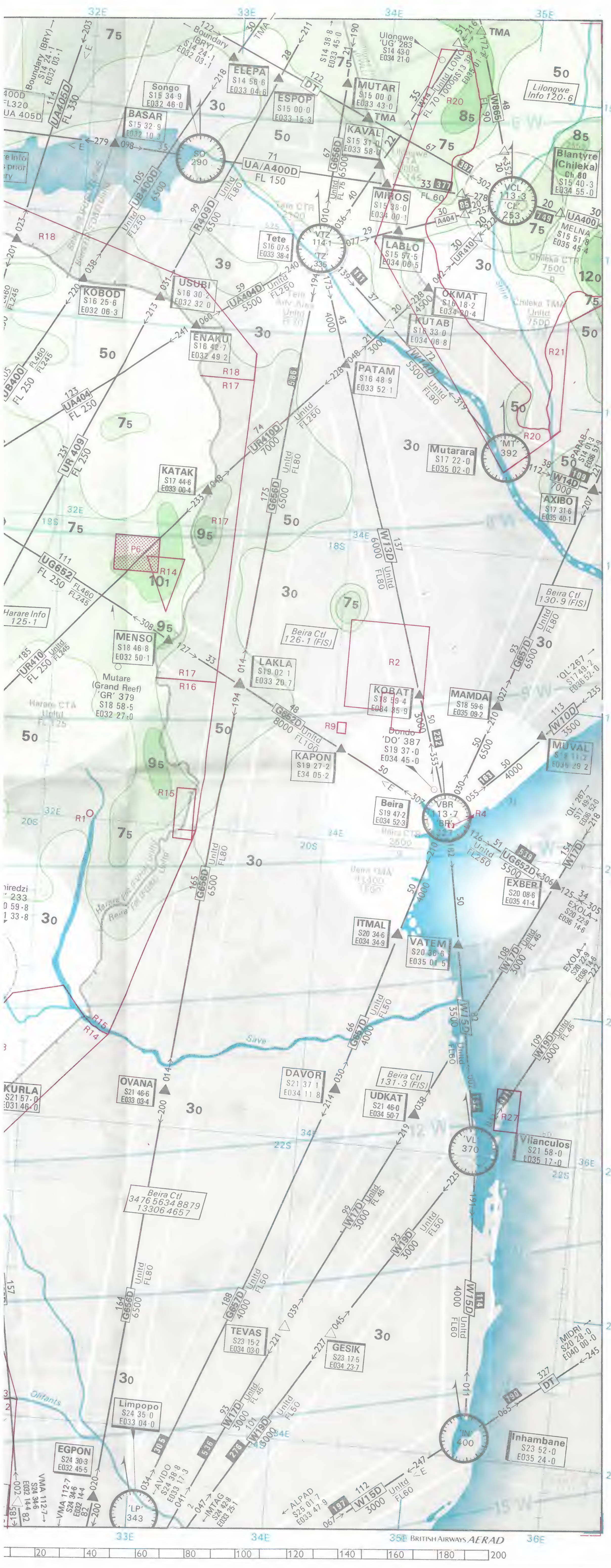
BOTSWANA AIR CORRIDORS

No aircraft shall fly more than 5nm west of Gaborone-Francistown railway, except within air corridors, unless equipped with:-

i) Serviceable HF capable of two-way communication with Jo'burg & Windhoek FIC
ii) Serviceable VHF radio
iii) Serviceable radio equipment enabling navigation in air corridors
iv) Serviceable survival location beacon

Notwithstanding the above requirements, no private pilot with less than 500 hrs including 50 hrs in command of type being flown, shall fly more than 5 nm west of railway except within air corridors.


RELIEF DATA INCOMPLETE
Max. elev 5200 ft
EF DATA
MPLETE
vation 5500 ft
COMPLETE
IBNOP S14 59·7 E029 18·7
Lusaka Ch 82 S15 20·0 E028 25·0
Lusaka App 121·3
LV 113·6
Lusaka 'LE' 325
EVOLU S15 42·7 E026 38·3
UA400F/UR525F FL 250
UA400F FL 250
Lusaka CTA Unltd FL 115
Lusaka Info 120·5 120·9
Lilayi 'LY' 235 S15 29·6 E028 14·6
S15 55·1 E027 48·6
S16 09·7 E028 27·2
TIMAX S15 23·4 E029 17·6
UA400D FL 250
GADBA S15 56·9 E029 01·8
KEPOK S15 27·0 E030 23·0
UA 400D Max FL320 crossing UA 405D
A400D 7500
Contact Harare Info at least 5 mins prior FIR boundary
Harare Info 125·1
MAKIR S16 11·0 E031 33·0
KOBOD S16 25·6 E032 06·3
CHOMA S16 45·0 E026 58·0
RETAR S16 37·7 E028 28·3
KB 'DW' 300
Kariba S16 31·0 E028 53·2
PASAL S16 30·5 E029 37·2
UG652F FL 250
Kariba CTR 5500
Kariba CTA FL250 5500
NEMBU S17 01·8 E029 14·8
Harare CTA Kariba CTA below FL 125
Harare TMA FL 125
UB525/UR525 FL 250
Harare Radar 119·1
Do not overfly P1 at or below FL110
Harare CTA Unltd FL 125
Charles Prince CTR 6500
VSB 113·1
Livingstone CTA Unltd FL65
Livingstone CTR FL65
Livingstone App 124·3
Livingstone S17 48·7 E025 49·2
LR 112·5 'LI' 231
ALVIS S18 06·9 E025 18·0
Mpacha 'KL' 332
Kasane 'KAS' 287 KSV 113 3 Ch 80(DME)
Victoria Falls 'FA' 256 S18 04·2 E025 45·9
EXOBO S18 09·5 E025 26·4
UVELA S18 25·4 E025 08·9
UR544D
UB528 FL 250
Hwange VWN 114·5 S18 38·4 E026 59·7
Hwange CTA FL245 4500
Hwange CTR 4500
Hwange 'PO' 377 S18 39·8 E026 55·7
Victoria Falls CTA FL245 4500
Fylde Ch 96 (DME) S18 07·3 E029 52·2
VFY 114·9
SOKAP S18 29·1 E029 06·8
UA404F
S18 59·2 E027 18·0
Risco S19 00·7 E029 42·7
'RC' 385
Harare S17 54·8 E031 07·1 Ch 78
Harare CTR 6500
Harare TMA FL 125 6500
UG652 FL 250
Harare Info 125·1
Gweru (Thornhill) CTA FL 285 6500
LOTIS S19 20·9 E025 55·3
BONAL S19 18·4 E026 05·1
ORLON S19 20·8 E027 45·4
NAGAD S19 10·5 E028 34·8
Bulawayo CTA Unltd 5500
UA/A404D 8000
Gweru (Thornhill) VTL 114·3 Ch 90 S19 26·7 E029 51·7
Bulawayo Ch 104 S20 01·7 E028 38·7
VBU 115·7
Bulawayo CTR 5500
'MS' 317
Masvingo S20 00·6 E030 50·7
Masvingo CTA FL 125 6500
Masvingo CTR 6500
UR410 FL 250
Mutare (Grand Reef) 'GR'
Harare CTA Unltd FL 125
APMOR S20 37·3 E028 01·9
KULBU S20 56·8 E027 49·9
UB/B400 FL 250
W93 8000
Makgadikgadi Pan
VFR corridor
Orapa 'OR' 295 S21 16·4 E025 18·2
Francistown S21 09·7 E027 28·5
FTV 112·4 'FT' 375
Francistown Flg. Trg. Area
Francistown CTR 5500
Francistown TMA FL 245 5500
Bulawayo CTA Unltd FL 125
Harare Info 125·1
UA 405D FL 250
Chiredzi 'CZ' 250 S20 57·8 E031 31·3
Chiredzi 'BI' 233 S20 59·8 E031 33·8
Chiredzi CTR 4500
Chiredzi CTA FL 245 4500
DANAM S21 39·0 E028 26·0
Greefswald S22 14·7 E029 24·6
ANTOG S22 01·6 E028 22·5
UTULI S22 00·0 E029 34·2
DELNA S22 10·0 E029 27·5
GWV 117·9
Messina 'MI' 335 S22 21·5 E029 59·6
KURLA S21 57·0 E031 46·0
Limpopo
Selebi-Pikwe 'SP' 303 S22 03·1 E027 48·4 118·7
Selebi CTR 7500
TAVLA S22 37·4 E028 17·6
BOPAL S022 27·1 E028 49·7
Safari Ranches 'SF' 277·5 S22 26·0 E029 18·0
Venetia Mine 'VM' 417·5 S22 27·0 E029 18·0
Louis Trichardt 'LS' 485 S23 09·5 E029 43·5
Louis Trichardt 'LU' 472·5 S23 09·5 E029 35·7
Louis Trichardt 'LO' 457·5 S23 03·0 E029 52·0
Louis Trichardt LTV 115·0 Ch 97(DME)
Thohoyandou 'THO' 325 S22 58·0 E030 29·0
Thohoyandou 'TOY' 285 S23 04·5 E030 18·9
Tshikodeni 'TSH' 252·5 S22 30·6 E030 57·0
Lowveld Info 119·0126·7 (M-F04-17)
Giyani 'GI' 430 S23 19·6 E030 40·8
UTVIN S23 37·7 E025 18·1
SOKIM S23 43·7 E026 15·5
KUTLA S23 35·5 E026 19·0
Ellisras 'ER' 345 ERV 116·3 Ch 110(DME) S23 37·5 E027 57·3
Pietersburg Mil Low Flying Area
Louis Trichardt TMA 7500
Pietersburg 'PI' 425 S23 56·1 E029 28·7
Pietersburg PBV 117·? Ch 1?? 'PB' 410
Tzaneen Flg. Trg. Area
Tzaneen 'TZ' 212·5 S23 49·5 E030 19·5
Gravelotte 'JP' 402·5 S23 54·0 E030 41·0
Phalaborwa CTR 6000
Phalaborwa S23 54·0 E031 09·1
PHV 115·3 'PW' 272
Hoedspruit TMA FL 250 6000 SRA below
Hoedspruit 'HA' 265 HSV 114·0 S24 20·6 E031 03·2
EGPON S24 30·3 E032 45·5
ATUSI S24 34·4 E032 18·7
Gaborone Ch 84 S24 35·8 E025 50·0
Gaborone TMA R FL 245
Gaborone CTR 5500
Gaborone 'GBE' 311 S24 31·2 E025 59·7
GBV 113·7
Gaborone TMA A FL 95 5500
Jwaneng 'JWN' 277·5 S24 35·5 E024 42·7
Gaborone Flg. Trg. Area
Gaborone(SW) Training Area
ETOSA
ODKER S24 08·5 E028 05·0
GABNA S24 10·0 E028 34·0
RUDAS S24 19·4 E026 44·1
ORKAN S24 32·5 E026 55·0
OTALA S24 30·0 E027 46·0
Thabazimbi 'TB' 397·5 S24 36·0 E027 25·0
Potgietersrus 'PR' 360 S24 11·0 E029 01·0
Ranch Motel 'PL' 382 S24 02·8 E029 16·4
Nylstroom NY 465 S24 41·1 E028 25·7
Jo'burg Info North Sector 127·4
Mariepskop 'MP' 297 S24 33·0 E030 52·0
Mica 'HP' 395 S24 09·0 E030 50·1
25E 26E 27E 28E 29E 30E 31E 32E
Nautical Miles 50 0 20 40 60 80 100 120 140 160 180 200



AFR 7 | BRITISH AIRWAYS AERAD | AFR 8

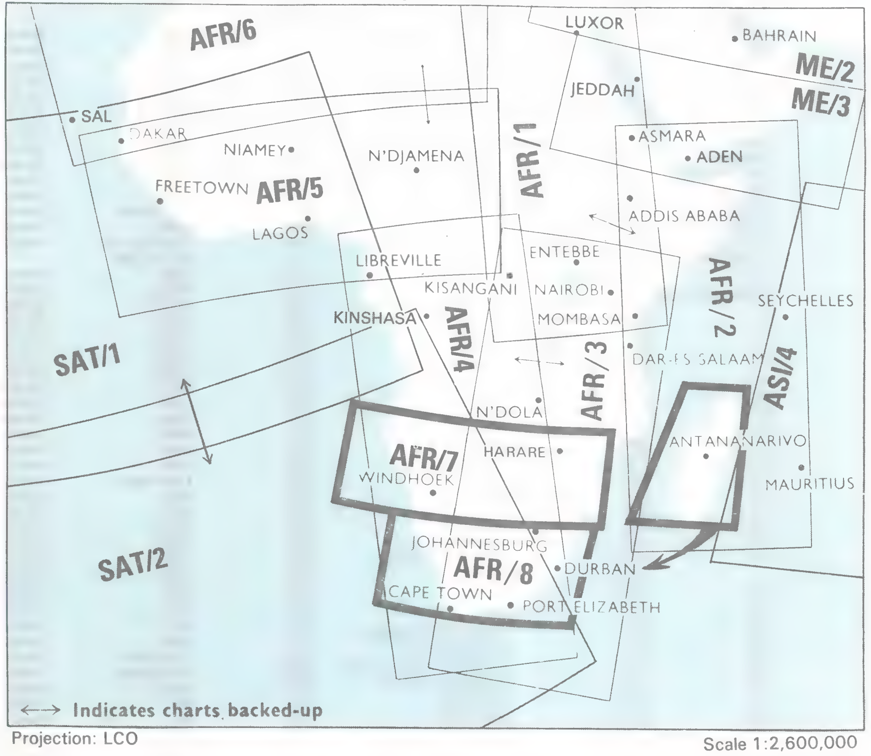
ROUTE FACILITY CHART

Isogonals for 1985
Mean annual change 12'E

Isogonals for 1985
Mean annual change 7'E

EFF
17 SEP 92
HIGH/LOW ALTITUDE

This Chart is to be used in conjunction with the current bulletin



Projection: LCO

Scale 1:2,600,000
1 cm = 15 n.m.
(Madagascar Inset) - Scale 1:4,200,000
1 cm = 23 n.m.

REVISION Airways, Facilities, Controlled Airspace, Restricted Airspace,

AFR 7/8 COMMUNICATIONS

ALEXANDER BAY TWR 118·7 5680
❶ANTANANARIVO (IVATO) TWR 118·1 119·7
BEIRA APP 119·7 5680, TOWER 118·1 5680
BLANTYRE (CHILEKA) APP 124·3 TWR 118·1
❷BLOEMFONTEIN (HERTZOG) APP 124·3 TWR 118·1, ATIS 114·1
BULAWAYO APP 119·7, TWR 118·3
❷CAPE TOWN (MALAN) APP 119·7 TWR 118·1, ATIS 115·7
CHIREDZI (BUFFALO RANGE) APP/TWR 124·9
DUNNOTTAR APP 122.5 TWR 128·8
DURBAN (BOTHA) APP 119·1, TWR 118.7 ATIS 112·5
❷EAST LONDON (SCHOEMAN) APP/TWR 118·3 ATIS 114·5
FRANCISTOWN TWR 118·1
GABORONE (KHAMA) TWR 118·3
FIC/ACC 126·1, 127·1,
5493 6586 8888 13294
❷GEORGE (P.W. BOTHA) APP/TWR 118·9
GRAHAMSTOWN RADIO 123·5
GROOTFONTEIN APP 123·3 TWR 126.3
HARARE APP 119·1, TWR 118·1 ATIS 113·1
HOEDSPRUIT APP 126·4 TWR 122·0
HWANGE (NATIONAL PARK) APP/TWR 119·9
INHAMBANE INFO 118·1 5680
KARIBA APP/TWR 125·3
KEETMANSHOOP TWR 118·3 5680
❷KIMBERLEY APP/TWR 123·8
KLEINSEE (A/G) 123·5
KROONSTAD (A/G) 122·4
LANGEBAANWEG APP 122·5 TWR 128·5
LILONGWE APP 128·0, TWR 118·7
❸LIVINGSTONE APP 124·3, TWR 118·1
LOUIS TRICHARDT TWR 121.2
LUSAKA APP 121·3 TWR 118·1 ATIS 113·5
❶MAHAJANGA TWR 119·1
MAPUTO APP 121·3 5680, TWR 118·1 5680
MASERU APP 120·7 TWR 118·5 5680
MASVINGO APP/TWR 119·6
MATSAPA APP 124·9, TWR 118·3
MAUN TWR 118·7
MMABATHO RADIO 119·3
MORONI (HAHAIA) APP 119·7
MPACHA A/G 125·6
❶NAMPULA INFO 121·3, 118·1
ONDANGWA A/G 125·6
OVERBERG APP 119·8 TWR 129·4
PHALABORWA TWR Van Eck Tower 118·3
PIETERSBURG APP 120·8 TWR 128·8
❷PORT ELIZABETH (VERWOERD) APP 119·7 TWR 118·1, ATIS 112·9
POTCHEFSTROOM TWR 126.0
RICHARDS BAY (A/G) 122·4
RUNDU A/G 125·0
SELEBI-PIKWE TWR 118·7
SISHEN (A/G) 123·5
SKUKUZA (A/G) COMAIR SKUKUZA 123·5
SWARTKOP TWR 123.2
TOAMASINA TWR 118·3
❶TETE APP 125·9 TWR 118·3
UMTATA TWR 121·3
UPINGTON (VAN RYNEVELD) TWR 121·3
❷VICTORIA FALLS APP 121·1, TWR 118·7
VILANCULOS INFO 118·1
VIRGINIA TWR 120·6
WALVIS BAY TWR 122·5
WATERKLOOF APP 125·3 TWR 124·1
WINDHOEK (J.G. STRYDOM) APP 120·5 TWR 118·1
WINDHOEK (EROS) TWR 118·7
YSTERPLAAT TWR 125·6

For airfields in Johannesburg region see area chart

FOR AREA COMMUNICATIONS SEE CHART

WEATHER BROADCASTS

ANTANANARIVO VOLMET 6617 10073 02-20 H+25,55.
BLOEMFONTEIN MET 130·3 04-18 CONT.
LUSAKA ATIS 113·5 04-16
Flagged number against airfield name indicates met info from station above.

International Boundaries shown on this chart are for information only and should not be regarded as authorative.

AFR 7/8-AIRSPACE RESTRICTIONS

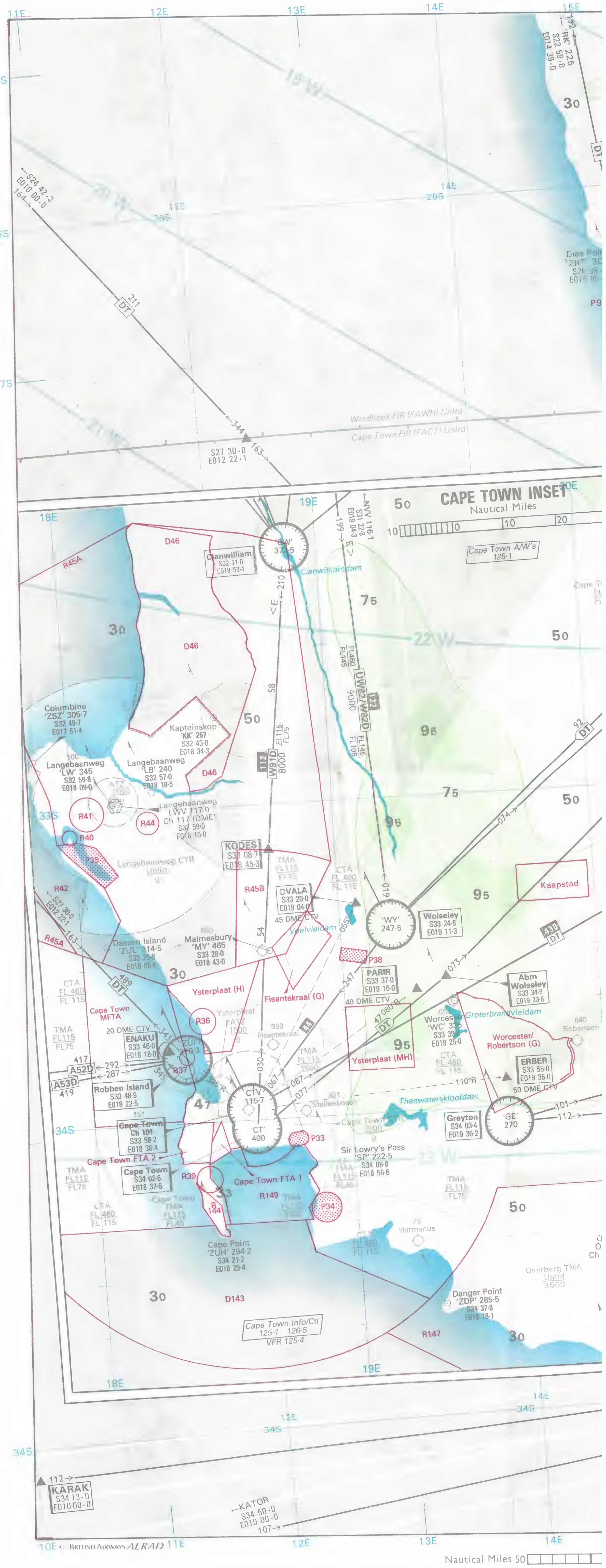
FOR DETAILS OF AIRSPACE RESTRICTIONS WITHIN AREA COVERAGE, SEE AREA CHARTS

Ident.	Alt./Lev.	Remarks
ANGOLA		
R9	Unltd	Permanent
BOTSWANA		
FBP1	2000g	Permanent
FBP5	2500g	Permanent
FBD6	3000g	Permanent
FBD8	6000g	Notified
FBD9	6000g	Permanent
FBR10	1000g	Permanent
FBR11	1000g	Permanent
FBR12	1000g	Permanent
FBR13	1000g	Permanent
FBR14	1000g	Permanent
FBR15	1000g	Permanent
FBR16	FL150	Permanent
FBD17	1000g	Permanent
FBR18	FL125	Permanent
FBR19	FL75	Permanent
FBR20	7000-FL410	Permanent
FBR21	FL250	Permanent
FBR22	7000	Notified
FBR23	FL125	Permanent
Francistown Flying Training Area	7000	Permanent
Gaborone Flying Training Area	FL100	Permanent
Gaborone (SW) Training Area	7000	Permanent
Maun Flying Training Area	7000	Permanent
LESOTHO		
FXD6	2000g	Permanent
MADAGASCAR		
D1	16500	Notified
D3	14800	Notified
D5	44700	Notified
D6	5800	0330-0830
D7	1400	HJ
D8	2300g	HJ
D9	4900	HJ M-Sat
D10	4500	HJ
D11	9900	Notified
D12	3100	HJ
D13	9900	Notified
D14	9900	Notified
D15	9900	Notified
D16	9900	Notified
D17	9900	Notified
D19	4000g	1st Tues of month
	1000g	M,W,F
D20	2700g	M,W
D21	1000g	W,F
D22	2300g	HJ
D23	FL20	10-14,Tu,Fr & Notified
D24	FL105	HJ & Notified
D25	FL85	HJ Sat, Sun & Notified
R18	8300g	HJ Sun & Notified
R24	Unltd	Permanent
R25	Unltd	Permanent
R26	Unltd	Permanent
R27	Unltd	Permanent
R28	5000g	Permanent
R29	Unltd	Permanent
R30	Unltd	Permanent
R31	Unltd	Permanent
R32	Unltd	Permanent
R33	Unltd	Permanent
R34	Unltd	Permanent
R35	Unltd	Permanent
MOZAMBIQUE		
D23	Unltd	Notified
D25	Unltd	Notified
P22	4000g	Permanent
P24	4000g	Permanent
P26	1500g	Permanent
R2	2000g	PPO
R3	2000g	PPO
R5	6600	Notified
R9	5000g	PPO
R10	4000g	PPO
R11	4000g	PPO
R12	4000g	PPO
R13	4000g	PPO
R14	4000g	PPO
R15	4000g	PPO
R16	4000g	PPO
R17	4000g	PPO
R18	4000g	PPO
R19	4000g	PPO
R20	4000g	PPO
R21	4000g	PPO
R27	4000g	PPO
R28	FL50-FL100	Notified
R29	FL80	Nofified
R32	Unltd	Permanent
SWAZILAND		
FDR1	2000g	Permanent
FDR2	2000g-10000	Permanent
FDR3	10000	PPO
FDR4	2000g	Permanent
FDR5	2000g	Permanent
FDR6	2000g	Permanent
FDR7	2000g	Permanent
FDR8	2000g	PPO
FDR9	2000g	PPO
FDD11	3000g	Permanent
ZAMBIA		
D18	FL65	HJ
D20	FL70	HJ
D23	Unltd	Permanent
D31	FL70	Permanent
P2	6000	Permanent
P4	Unltd	Permanent
R5	1500	Permanent
R10	1500	Permanent
R30	1500g	Permanent
ZIMBABWE		
D1	FL 310	Notified
D2	Unltd	M-F: 05-13
D3	Unltd	Permanent
D4A	6500	Permanent
D4B	FL80	HJ
D5A	6000	Permanent
D5B	FL80	Permanent
D7	FL140	HJ
D9	FL80	HJ
D10	FL140	HJ
D11	6000	HJ
P1	5000g	Permanent
P2	Unltd	Permanent
P3	7000g	Permanent
P4	10000	Permanent
P5	FL290	Permanent
P6	FL200	Permanent
P7	Unltd	Permanent
P8	Unltd	Permanent
P9	7000g	Permanent
P10	8500	Permanent
P11	FL100	Permanent
R1	1000g	Permanent
R2	1000g	Permanent
R3	1500g	Permanent
R4	1000g	Permanent
R5	1500g	Permanent
R6	500g	Permanent
R7	500g	Permanent
R7A	500g	Permanent
R8	500g	Permanent
R9	500g	Permanent

Ident.	Alt./Lev.	Remarks
ZIMBABWE Contd.		
R10	500g	Permanent
R11	500g	Permanent
R12	500g	Permanent
R13	500g	Permanent
R14	500g	Permanent
R15	500g	Permanent
R16	500g	Permanent
R17	500g	Permanent
R18	1500g	Permanent
R19	500g	Permanent
R20	500g	Permanent
R21	500g	Permanent
R22	500g	Permanent
R23	500g	Permanent
RSA		
P24	4000g	Permanent
P31	1000g	Permanent
P33	1500	Permanent
P34	FL45	Permanent
P35	500g	Permanent
P38	2000g	Permanent
P54	800g	Permanent
P93	1000g	Permanent
P94	1000g	Permanent
P95	1000g	Permanent
P177	4000g	Permanent
D26	FL130-Unltd	Permanent
D28	1000g	Permanent
D30	Gnd-FL100 & FL130-FL280	Permanent
D46	2000	Permanent
D53	39000g	Notified
D55	Notified	Notified
D70	FL100	Permanent
D89	3500g	Permanent
D98	5000g	Permanent
D143	FL460	Permanent
D191	8000g	Permanent
R20	Unltd	Permanent
R21	Unltd	Permanent
R22	4000g	Permanent
R23	Unltd	Permanent
R25	Unltd	Permanent
R27	FL90-FL280	Permanent
R29	Unltd	Permanent
R32	500	Permanent
R36	2000g	Permanent
R37	1000g	Permanent
R39	1500	Permanent
R40	FL30	Permanent
R41	FL30	Permanent
R42	FL30	Permanent
R43	500	Permanent
R44	Unltd	Permanent
R45A	1500-Unltd	Permanent
R45B	FL120-Unltd	Permanent
R47	Unltd	Permanent
R48	500	Permanent
R49	500	Permanent
R50	Unltd	Permanent
R51	500	Permanent
R52	500	Permanent
R62	1000g	Permanent
R63	FL80	Permanent
R64	Unltd	Permanent
R71	FL105-FL250	Permanent
R72	FL250-Unltd	Permanent
R73	FL110	Permanent
R76	FL250	Permanent
R78	FL105	Permanent
R79	FL150	Permanent
R86	Unltd	Permanent
R87	500	Permanent
R88	500	Permanent
R97	500	Permanent
R101	FL 430	Permanent
R102	FL 110	Permanent
R105	4000g	Permanent
R144	2000g	Permanent
P145	1000g	Permanent
P146	1000g	Permanent
R147	Unltd	Permanent
R148	Unltd	Permanent
R149	2500	Permanent
R150	1500	Permanent
R178	1500g	Permanent
R179	FL105	M:09-12 Tu,Th,Fri 07-12
R180	6000g	M:09-12 Tu,Th,Fri 07-12
R181	FL290	Permanent
Kaapstad	5000	Permanent
Rooikop	5000	Permanent
Temporary Rest. Area (TRA)	FL 290	H24
Eastern Temporary Rest. Area (E-TRA)	6000g	M:09-12 Tu,Th,Fr 07-12
Northern Temporary Rest. Area (N-TRA)	FL 105	M:09-12 Tu,Th,Fr 07-12
FLYING TRAINING AREAS		
Bloemfontein	6500g	Permanent
Bloemfontein Mil. Helicopter	6000(N) 6200(S)	Permanent
Bloemfontein /New Tempe	FL80	Permanent
Cape Town FTA1	2000	Permanent
Cape Town FTA2	FL40	Permanent
Cape Town MFTA	2000	Permanent
Durban Mil.Low	4000	Permanent
Durban/Virginia Gen.	3500	Permanent
Durban/Virginia Acrobatic	2000-4000	Permanent
East London FTA	3000	Permanent
Fisantekraal Gen.	FL40	Permanent
George	4500	Permanent
George Heli area	1500g	Permanent
Kimberley	5000g	Permanent
Mmabatho Gen.	FL195	Permanent
Mmabatho Low	500-1000	Permanent
Nshongweni Mil. Helicopter	500g	Permanent
Phalaborwa	6000	Permanent
Pietermaritzburg	4000	Permanent
Pietersburg Mil.Low Flg Area	200g	Permanent
Pilanesberg Gen.	8500	Permanent
Port Elizabeth Mil. Low	FL80	Permanent
Port Elizabeth & Uitenhage	FL110	Permanent
Potchefstroom	FL100	Permanent
Tzaneen	FL90	Permanent
Upington Gen.	FL70	Permanent
Welkom	FL90	Permanent
Windhoek/Eros	FL100	Permanent
Worcester/ Robertson	FL70	Permanent
Ysterplaat Helicopter	2000	Permanent
Ysterplaat Mil. Heli. Mountain	1000g	Permanent

MORSE SIGNALS

A	• —	M	— —	Y	— • — —
B	— • • •	N	— •	Z	— — • •
C	— • — •	O	— — —	1	• — — — —
D	— • •	P	• — — •	2	• • — — —
E	•	Q	— — • —	3	• • • — —
F	• • — •	R	• — •	4	• • • • —
G	— — •	S	• • •	5	• • • • •
H	• • • •	T	—	6	— • • • •
I	• •	U	• • —	7	— — • • •
J	• — — —	V	• • • —	8	— — — • •
K	— • —	W	• — —	9	— — — — •
L	• — • •	X	— • • —	0	— — — — —



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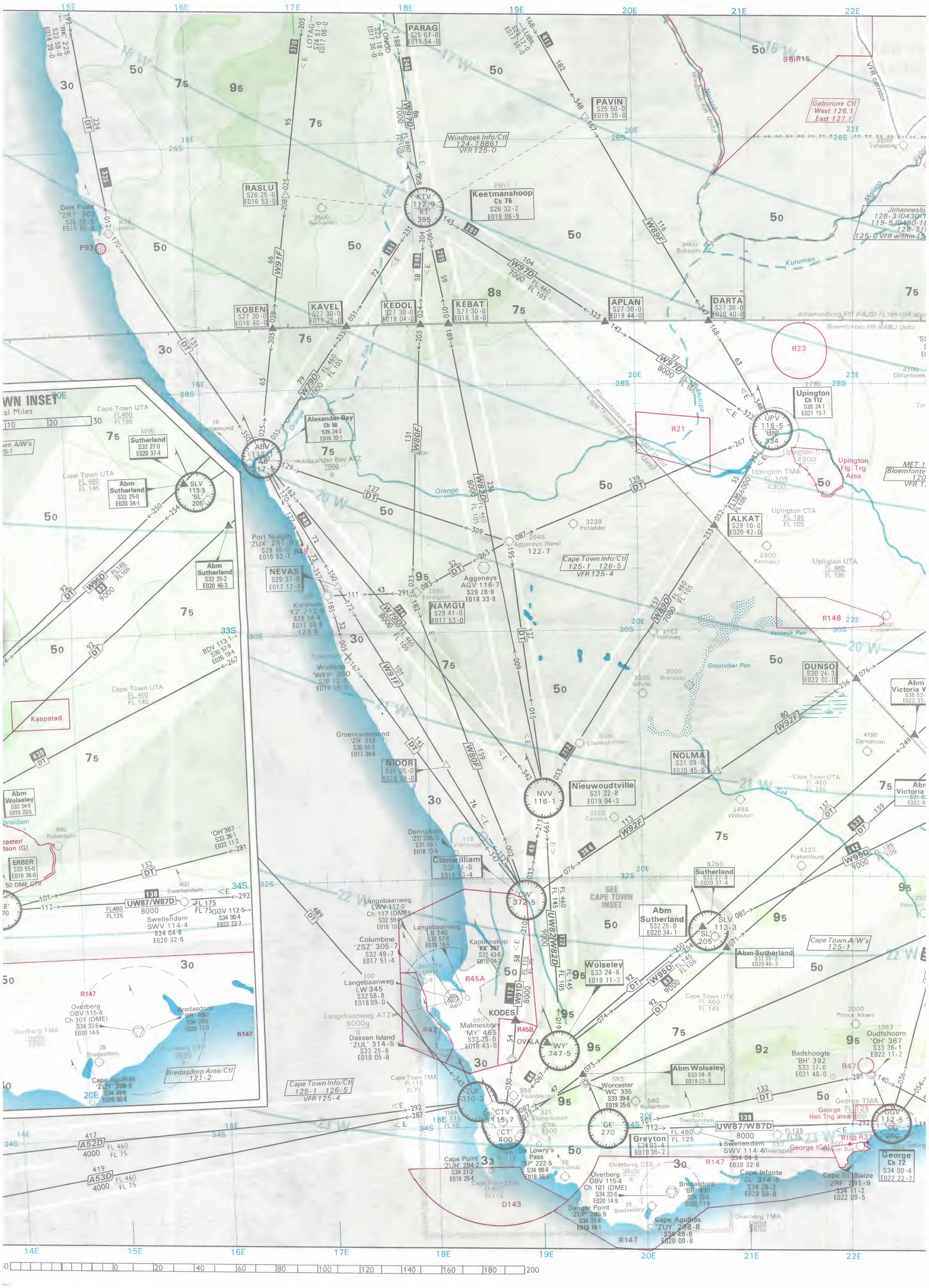
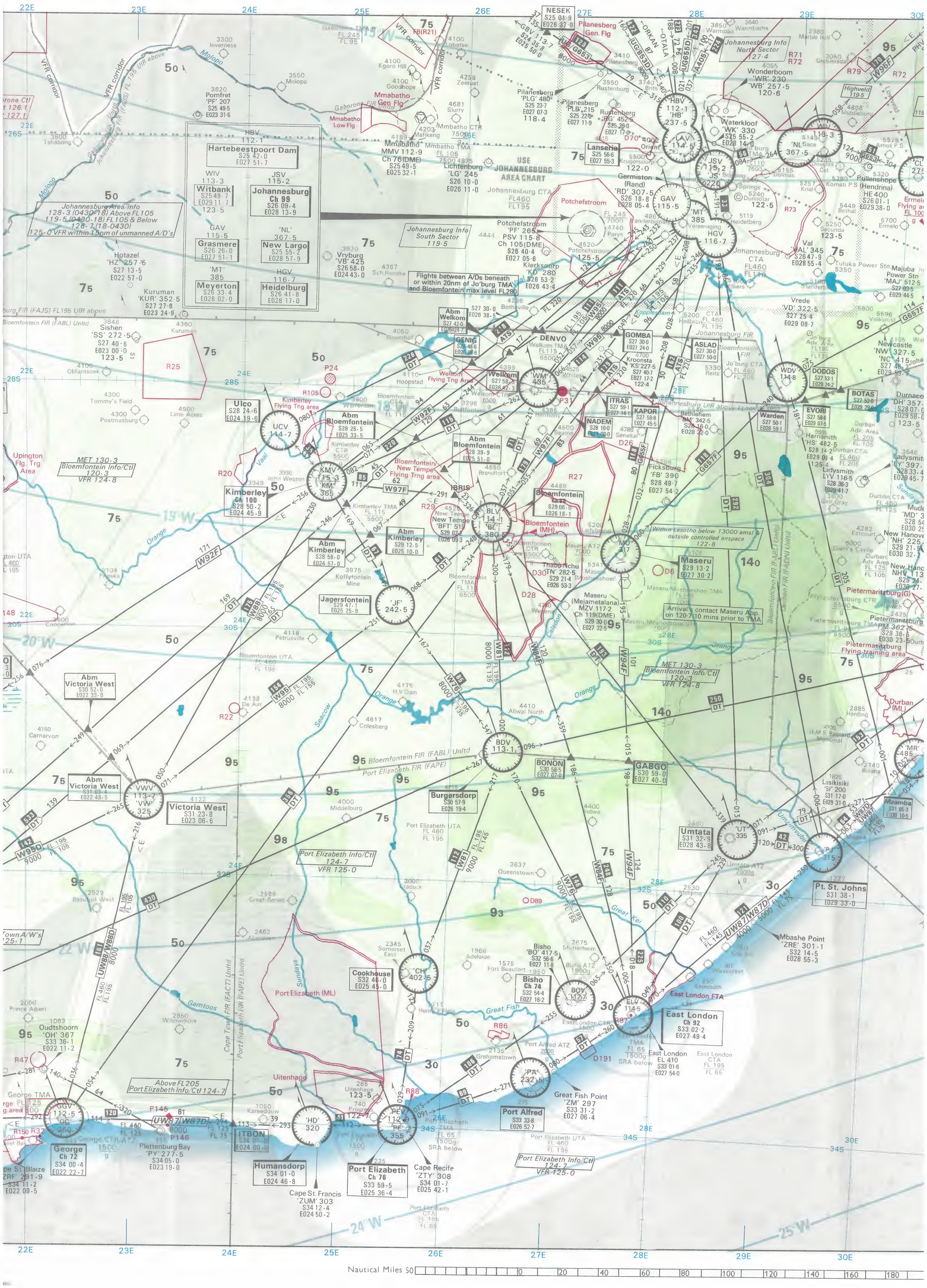
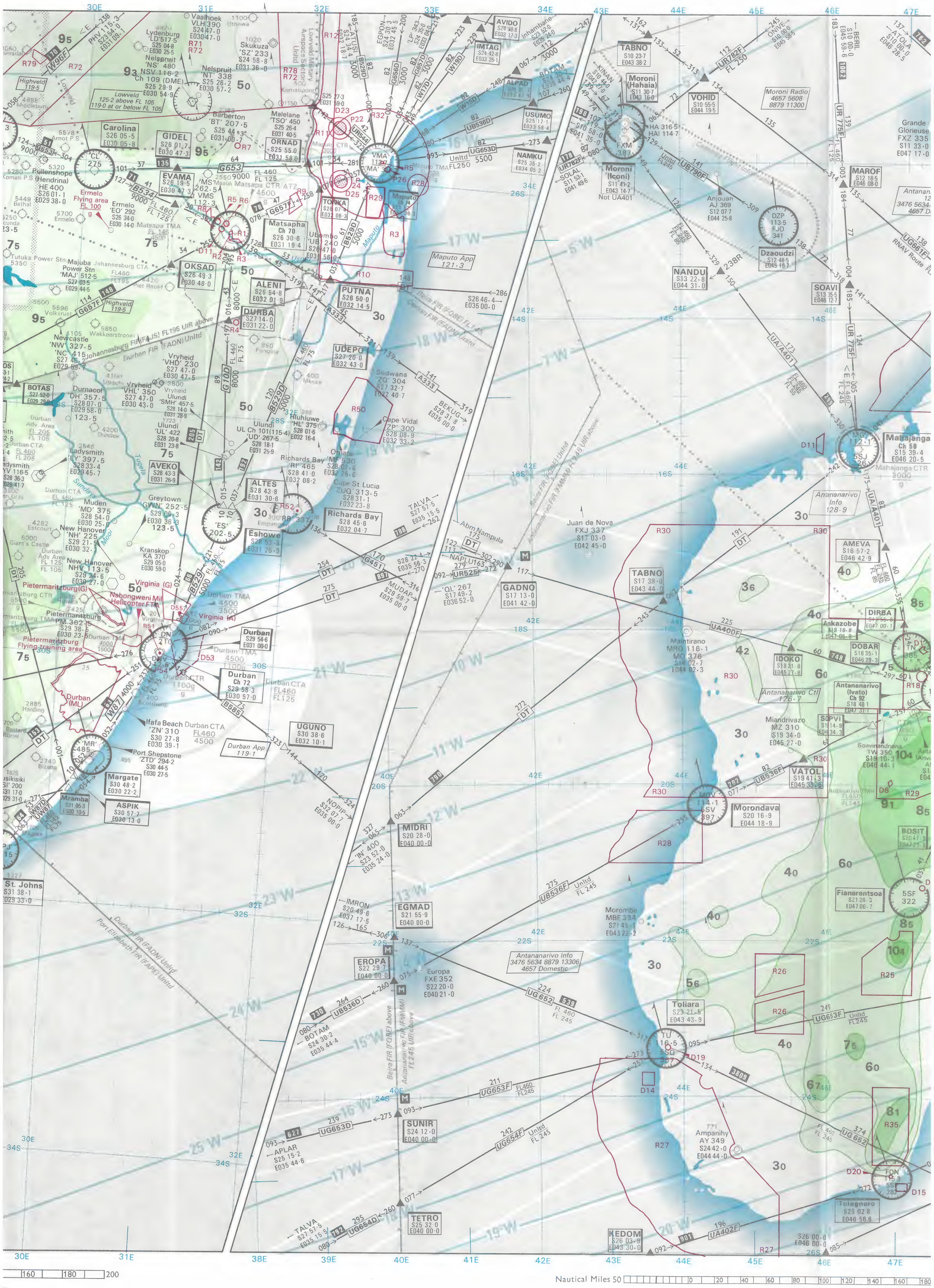

15E
16E
17E
18E
19E
20E
21E
22E
14E
PARAG S25 07·0 E017 54·0
LOTAG S24 51·0 E017 06·0
LONOD S23 18·0 E017 36·0
LUBIL S23 12·0 E017 56·0
'RK' 225 S22 59·0 E014 39·0
PAVIN S25 50·0 E019 35·0
RASLU S26 25·0 E016 53·0
KTV 112·9 'KT' 395
Keetmanshoop Ch 76 S26 32·2 E018 06·9
Windhoek Info/Ctl 124·7 8861 VFR 125·0
Diaz Point 'ZRT' 303 S26 38·0 E015 06·6
P93
Bethanien
Bokspits
Kuruman
Molopo
Nossob
Windhoek FIR Unltd
Gaborone Ctl West 126·1 East 127·1
(FB)R15
VFR corridor
Tshabong
Johannesburg 128·3 (0430-1 119·5 (0430-1 126·7 (1 125·0 VFR within 15
KOBEN S27 30·0 E016 40·0
KAVEL S27 30·0 E017 25·0
KEDOL S27 30·0 E018 04·0
KEBAT S27 30·0 E018 18·0
APLAN S27 30·0 E019 44·0
DARTA S27 30·0 E020 40·0
Johannesburg FIR (FAJS) FL195 Unltd
Bloemfontein FIR (FABL) Unltd
R23
Olifantsoek
W97D 7000 FL 460 FL 105
W79D 7000 FL 460 FL 105
W89F
W91F
W80F
W82D 8000 FL 460 FL 105
W92F
W95D 9000
UW82/W82D
UW87/W87D 8000
A52D 4000 FL 460 FL 75
A53D 4000 FL 460 FL 75
ABV 112·1 'AB' 117·5
Alexander Bay Ch 58 S28 34·2 E016 32·1
Alexander Bay ATZ 7000
Oranjemund
Orange
Fish
Upington Ch 112 S28 24·1 E021 15·7
UPV 116·5 'UN' 334
Upington CTR 4300
Upington TMA FL 105 4300
Upington Flg. Trg Area
Upington CTA FL 195 FL 105
Upington UTA FL 460 FL 195
ALKAT S29 10·0 E020 42·0
R21
Bloemfontein FIR (FABL) Cape Town FIR (FACT) Unltd
MET 1 Bloemfontein 120 VFR 1
Aggeneys (New) 2648 122·7
Cape Town Info/Ctl 125·1 126·5 VFR 125·4
Pofadder 3239
Kenhardt 2900
Aggeneys AGV 116·7 S29 28·9 E018 33·8
Springbok 2890
NAMGU S29 41·0 E017 53·0
Port Nolloth 'ZUX' 291·9 S29 15·0 E016 52·1
R49
NEVAS S29 37·0 E017 12·0
Kleinsee 'KZ' 212·5 S29 38·4 E017 05·4 123·5
Wolfkop 'WKP' 360 S30 12·0 E017 18·0
Halfweg
Brandvlei 3000
Gifvlei 3200
Grootvloer Pan
Verneuk Pan
R148
Copperton
DUNSO S30 24·3 E022 02·0
Carnarvon 4150
Abm Victoria W S30 52 E022 33
Groenriviermond 'ZR' 312 S30 51·9 E017 34·8
NIDOR S31 05·0 E018 09·0
Loeriesfontein 3000
NOLMA S31 09·0 E020 45·0
NVV 116·1
Nieuwoudtville S31 22·8 E019 04·3
Calvinia 3250
Williston 3485
Sak
Cape Town UTA FL 460 FL 195
Doringbaai 'ZS' 285·5 S31 49·1 E018 13·6
Vredendal 115
Clanwilliam S32 11·0 E018 53·4
Fraserburg 4220
CW 372·5
SEE CAPE TOWN INSET
Sutherland S32 27·0 E020 37·4
Abm Sutherland S32 25·0 E020 34·1
SLV 113·3 'SL' 205
Abm Sutherland S32 35·2 E020 46·3
Cape Town A/W's 125·1
Beaufort
Langebaanweg LWV 117·0 Ch 117 (DME) S32 59·0 E018 10·0
Langebaanweg LB 240 S32 57·0 E018 18·5
Kapteinskop 'KK' 257 S32 43·0 E018 34·2
Columbine 'ZSZ' 305·7 S32 49·7 E017 51·4
Langebaanweg LW 345 S32 58·8 E018 09·0
Langebaanweg ATZ 5000g
R45A
R45B
R42
KODES
Malmesbury 'MY' 465 S33 28·0 E018 43·0
OVALA
WY 247·5
Dassen Island 'ZUL' 314·5 S33 25·8 E018 05·6
Woiseley S33 24·8 E019 11·3
Abm Wolseley S33 34·9 E019 23·6
Worcester 'WC' 335 S33 39·8 E019 25·0
Robertson 640
Prince Albert 2000
Oudtshoorn 'OH' 367 S33 36·1 E022 11·2
Badshoogte 'BH' 392 S33 37·0 E021 48·0
R47
Cape Town TMA FL 115 FL 75
ZUI 310·3
CTV 115·7 'CT' 400
Fisantekraal 399
Stellenbosch 321
CTR 2500
GE 270
Greyton S34 03·4 E019 36·2
Swellendam 407
Swellendam SWV 114·4 S34 04·6 E020 32·6
Riversdale
George TMA FL 125 FL 75
George Heli Trg area
GGV 112·5 'GC' 260
George Ch 72 S34 00·4 E022 22·7
George (GA)
R150
R32
Cape St Blaize 'ZRF' 291·9 S34 11·2 E022 09·5
Cape Infanta 'ZL' 314·5 S34 28·3 E020 50·8
Cape Point 'ZUH' 294·2 S34 21·2 E018 29·4
Sir Lowry's Pass 'SP' 222·5 S34 08·8 E018 56·6
Hermanus
D143
Overberg CTA 3500
Overberg OBV 115·4 Ch 101 (DME) S34 33·6 E020 14·9
Danger Point 'ZDP' 285·5 S34 37·8 E019 18·1
Bredasdorp 'BR' 490 S34 32·0 E020 17·0
Cape Agulhas 'ZUY' 298·8 S34 49·8 E020 00·8
Overberg TMA Unltd 3500
R147
WN INSET
al Miles
Cape Town UTA FL460 FL195
Sutherland S32 27·0 E020 37·4
wn A/W's 5·1
Abm Sutherland S32 25·0 E020 34·1
SLV 113·3 'SL' 205
Abm Sutherland S32 35·2 E020 46·3
Cape Town UTA FL 460 FL 145
BDV 113·1 S30 57·8 E026 19·4
Kaapstad
Abm Wolseley S33 34·9 E019 23·6
Robertson 640
'OH' 367 S33 36·1 E022 11·2
ERBER S33 55·0 E019 36·0
50 DME CTV
Swellendam 407
GGV 112·5 S34 00·4 E022 22·7
Swellendam SWV 114·4 S34 04·6 E020 32·6
Overberg OBV 115·4 Ch 101 (DME) S34 33·6 E020 14·9
Overberg TMA Unltd 3500
Bredasdorp 'BR' 490 S34 32·0 E020 17·0
Bredasdorp
Cape Agulhas 'ZUY' 298·8 S34 49·8 E020 00·8
Bredasdorp Area/Ctl 121·2
R147
Cape Town Info/Ctl 125·1 126·5 VFR 125·4
16 W
17 W
20 W
21 W
22 W
23 W
0 20 40 60 80 100 120 140 160 180 200


22E
23E
24E
25E
26E
27E
28E
29E
30E
NESEK
S25 01·9
E026 37·0
Pilanesberg Gen. Flg
3300 Inverness
Molopo
VFR corridor
Gaborone TMA B
FL 245
FL 95
FB(R21)
4100 Lobatse
4100 Kgoro Hill
3550 Molopo
4100 Goodhope
3820 Pomfret 'PF' 207
S25 49·5 E023 31·6
Gaborone FIR Unltd
Mmabatho Gen Flg
Mmabatho Low Flg
4258 Zeerust
4681 Slurry
4203 Mafikeng
Mmabatho CTR
Mmabatho TMA
FL 105
Mmabatho
MMV 112·9
Ch 76(DME)
S25 49·5
E025 32·1
Lichtenburg 'LG' 245
S26 10·0
E026 11·0
USE JOHANNESBURG AREA CHART
Johannesburg CTA
FL460
FL195
Pilanesberg 'PLG' 480
S25 23·7
E027 07·3
118·4
Pilanesberg 'PLB' 215
S25 22·0
E027 11·9
Rustenburg 'RG' 452·5
S25 39·0
E027 17·0
3410 Pilanesberg
3550 Rustenburg
ORKAN
UG853D
UG655D
A405
Johannesburg Info North Sector 127·4
3850 Warmbad
3640 Warmbaths
2380 Marble Hall
3050 Groblersdal
Wonderboom 'WR' 230
'WB' 257·5
120·6
HBV 112·1 'HB' 237·5
LAV 114·5
Waterkloof 'WK' 330
S25 55·2
E028 14·0
JSV 115·2 'JS' 220
NL 367·5
Highveld 119·5
R71
R72
R73
R79
W96F
Lanseria
S25 56·6
E027 55·3
D70
4002 Orient
5500 Krugersdorp
Germiston (Rand) 'RD' 307·5
S26 18·8
E028 05·4
GAV 115·5
122·0
'MT' 385 Vereeniging
HGV 116·7
5119 Heidelberg
5240 Dunnottar 122·5
Pullenshope (Hendrina) 'HE' 400
S26 01·1
E029 38·0
5280 Komati P.S
Kriel
5449 Bethal
5700 Ermelo
5250 Secunda 123·5
Val 'VAL' 345
S26 47·9
E028 55·4
Tutuka Power Stn
5350
Majuba Power Stn 'MAJ' 512·5
S27 03·5
E029 44·5
Hartebeestpoort Dam
S25 42·0
E027 51·7
HBV 112·1
WIV 113·3
Witbank
S25 49·7
E029 11·7
123·5
JSV 115·2
Johannesburg Ch 99
S26 09·4
E028 13·9
GAV 115·5
Grasmere
S26 26·0
E027 51·1
'NL' 367·5
New Largo
S25 55·2
E028 57·9
'MT' 385
Meyerton
S26 33·4
E028 02·0
HGV 116·7
Heidelburg
S26 41·8
E028 17·0
Johannesburg Area/Info
128·3 (0430-18) Above FL105
119·5 (0430-18) FL105 & Below
128·7 (18-0430)
125·0 VFR within 15nm of unmanned A/D's
Hotazel 'HZ' 257·5
S27 13·5
E022 57·0
Kuruman 'KUR' 352·5
S27 27·6
E023 24·9
3930 Vryburg 'VB' 425
S26 58·0
E024 43·0
4367 Sch.Reneke
Johannesburg Info South Sector 119·5
Potchefstroom
Potchefstroom 'PF' 265
PSV 115·8
Ch 105(DME)
S26 40·4
E027 05·6
4520 Potchefstroom 125·5
Klerksdorp 'KD' 280
S26 53·2
E026 43·4
Flights between A/Ds beneath or within 20nm of Jo'burg TMA and Bloemfontein max level FL280
Vaal
4236 Bothaville
Bloemfontein FIR (FABL) Unltd
3848 Sishen 'SS' 272·5
S27 40·6
E023 00·0
123·5
4360 Kuruman
R25
4100 Olifantsoek
4050 Bloemhof
Abm Welkom
S27 42·0
E026 24·7
GENIG
DENVO
Welkom TMA
FL115
6500
GOMBA
S27 30·0
E027 24·0
4700 Kroonstad 'KS' 227·5
S27 40·7
E027 17·2
122·4
Kopjesdam
5200 Heilbron
ASLAD
S27 30·0
E027 50·0
Johannesburg FIR
Johannesburg CTA
FL 460
FL 205
5330 Reitz
WDV 114·8
DODOS
S27 53·1
E029 24·2
Vrede 'VD' 322·5
S27 25·4
E029 09·7
Newcastle 'NW' 327·5
'NC' 415
BOTAS
Durnacol 'DH' 357
4110 Hoopstad
Welkom Flying Tng Area
Welkom
S27 58·5
E026 42·3
WM 435
P31
4525 Whites
ITRAS
KAPOR
Bethlehem 'BM' 342·5
S28 16·0
E028 22·0
Warden
EVORI
Harrismith 'HS' 482·5
Ladysmith 'LY' 397
Ladysmith LYV 116·5
Sishen
P24
R105
Ulco
S28 24·6
E024 19·6
UCV 114·7
Kimberley Flying Tng area
3800 Warrenton
Abm Bloemfontein
S28 26·5
E025 33·5
Bloemfontein CTA
FL 195
FL 115
4300 Tommy's Field
4300 Postmasburg
4900 Lime Acres
Upington Flg. Trg Area
MET 130·3
Bloemfontein Info/Ctl 120·3
VFR 124·8
R20
Vaal
KMV 115·3 'KM' 365
Kimberley CTR 5500
3936 John Weston
Kimberley Ch 100
S28 50·2
E024 45·9
3949
Abm Bloemfontein
S28 39·9
E025 51·0
Bloemfontein/New Tempe Flying Tng area
4650 Brandfort
NADEM
4500 Beatrix
4780 Senekal
D26
5264 Ficksburg 'FB' 390
S28 49·7
E027 54·2
R27
4469
IBRIS
R29
Kimberley TMA
FL 115
5500
New Tempe
New Tempe 'BFT' 519
S29 02·1
E026 09·3
BLV 114·1 'BL' 380
Bloemfontein
S29 06·0
E026 18·1
Bloemfontein (MH)
Abm Kimberley
S29 12·5
E025 10·0
Abm Kimberley
S28 58·0
E024 57·0
3975 Koffyfontein Mine
Bloemfontein CTR 6500
Bloemfontein TMA FL 115 6500
Maseru ATZ 7000
Thaba Nchu 'TN' 282·5
S29 21·4
E026 53·3
5200 Ladybrand
5341 Maseru (Moshoeshoe)
D30
D28
4740 Wepener
MU 317
D6
Maseru
S29 13·2
E027 30·2
Within Lesotho below 13000 amsl & outside controlled airspace 122·8
Maseru TMA
Maseru (Mejametalana) MZV 117·2
Ch 119(DME)
S29 30·0
E027 32·5
Arrivals contact Maseru App. on 120·7 10 mins prior to TMA
Bloemfontein FIR (FABL) Unltd
Durban FIR (FADN) Unltd
4282 Estcourt
5000 Giant's Castle
Mooi River 'MD'
New Hanover 'NH' 225
Pietermaritzburg (G)
Pietermaritzburg CTR
Pietermaritzburg 'PM' 362·5
Pietermaritzburg Flying training area
Orange
Jagersfontein
S29 47·1
E025 25·9
'JF' 242·5
4104 Fraska
W92F
2600 Copperton
4118 Petrusville
Bloemfontein UTA
FL 460
FL 195
Caledon
Durban (ML)
2885 Harding
4700 H.M.S. Bastard Memorial
2740 Bizana
'MR' 485
1825 Lusikisiki 'SI' 200
S31 17·0
E029 31·0
Mzamba
S31 05·3
E030 10·5
Abm Victoria West
S30 52·0
E022 33·0
4176 H.V.Dam
4138 De Aar
R22
4160 Carnarvon
Seacow
4617 Colesberg
4410 Aliwal North
BDV 113·1
Bloemfontein FIR (FABL) Unltd
Port Elizabeth FIR (FAPE)
BONON
S30 58·5
E027 07·0
GABGO
S30 59·0
E027 40·0
Abm Victoria West
S31 03·4
E022 48·5
VWV 113·7 'VW' 325
4122 Victoria West
S31 23·8
E023 06·6
Burgersdorp
S30 57·9
E026 19·4
4000 Middelburg
4400 Indwe
Umtata
S31 32·9
E028 43·8
'UT' 335
Umzimvubu
'PJ' 315
Pt. St. Johns
S31 38·1
E029 33·0
Port Elizabeth UTA
FL 460
FL 195
Port Elizabeth Info/Ctl 124·7
VFR 125·0
3637 Queenstown
3000 Cradock
2929 Beaufort West
2589 Graaff Reinet
D89
Great Kei
Umtata ATZ
2530 Idutywa
Town A/W's 125·1
2462 Aberdeen
2345 Somerset East
'CH' 402·5
Cookhouse
S32 46·0
E025 45·0
1966 Adelaide
1575 Fort Beaufort
Bisho 'BO' 417·5
S32 56·6
E027 11·8
Bisho Ch 74
S32 54·4
E027 16·2
Bisho ATZ
2675 Stutterheim
BOY 112·7
ELV 114·5
East London FTA
East London
Ch 92
S33 02·2
E027 49·4
East London CTR
East London TMA
FL 65
East London EL 410
S33 01·6
E027 54·0
East London CTA
FL 195
FL 65
Mbashe Point 'ZRE' 301·1
S32 14·5
E028 55·3
Port Elizabeth (ML)
Sundays
Gamtoos
Great Fish
R86
2135 Grahamstown
1711 Hertzogs Flats
Port Alfred ATZ 2000
'PA' 232·5
Port Alfred
S33 33·8
E026 52·7
Great Fish Point 'ZM' 297
S33 31·2
E027 06·4
D191
R87
2000 Prince Albert
1063 Oudtshoorn 'OH' 367
S33 36·1
E022 11·2
R47
2650 Willowmore
Above FL205
Port Elizabeth Info/Ctl 124·7
Uitenhage
285 Uitenhage 123·5
740 Progress
George TMA
GGV 112·5 'GG' 260
George Ch 72
S34 00·4
E022 22·7
P145
P146
UW87/W87D
Plettenburg Bay 'PY' 277·5
S34 05·0
E023 19·0
ITBON
S34 00·0
E024 00·0
1050 Kareedouw
'HD' 320
Humansdorp
S34 01·0
E024 46·8
Cape St.Francis 'ZUM' 303
S34 12·4
E024 50·2
PEV 112·1 'PE' 355
Port Elizabeth Ch 76
S33 59·5
E025 36·4
Cape Recife 'ZTY' 308
S34 01·7
E025 42·1
Port Elizabeth TMA
FL 65
1500
SRA below
Port Elizabeth CTA
FL 195
FL 65
Port Elizabeth UTA
FL 460
FL 195
Port Elizabeth Info/Ctl 124·7
VFR 125·0
Cape St Blaize 'ZRF' 291·9
S34 11·2
E022 09·5
Cape Town FIR (FACT) Unltd
Port Elizabeth FIR (FAPE) Unltd
19°W
20°W
22°W
24°W
25°W
26S
28S
30S
32S
34S
50
75
95
98
93
140
30
Nautical Miles 50
0
20
40
60
80
100
120
140
160
180


30E
31E
32E
33E
34E
43E
44E
45E
46E
47E
Vaalhoek
VLH 390
S24 47·0
E030 47·0
Lydenburg
'LD' 517·5
Nelspruit
'NS' 480
NSV 116·2
Ch 109 (DME)
Nelspruit
'NT' 338
Skukuza
'SZ' 233
Highveld
119·5
Lowveld
125·2 above FL 105
119·0 at or below FL 105
Carolina
S26 05·5
E030 05·8
GIDEL
S26 01·7
E030 47·3
Barberton
'BT' 207·5
Malelane
'TSO' 450
ORNAD
S25 55·0
E031 58·0
Lowveld Military Airspace Sector Unltd
Komatipoort
VMA
113·7
'MA' 304
Maputo CTR
Maputo TMA FL250
Maputo
Maputo App
121·3
AVIDO
IMTAG
ALPAD
BOTAM
S24 30·2
E035 44·4
Inhambane
USUMO
S25 17·1
E033 58·4
NAMKU
S25 35·2
E034 05·2
G653
Ermelo Flying area FL 100
Ermelo
'EO' 292
EVAMA
S26 19·5
E030 47·3
'MS' 262·5
Msauli
VMS
112·3
Matsapha CTR ATZ
Matsapha
Ch 70
S26 30·6
E031 19·4
TONKA
Ubombo
'UB' 240
Matsapha TMA
Tutuka Power Stn
Majuba Power Stn
'MAJ' 512·5
Johannesburg CTA
OKSAD
S26 49·3
E030 48·0
ALENI
S26 54·8
E032 01·9
PUTNA
S26 50·0
E032 14·5
DURBA
S27 14·0
E031 22·0
Volksrust
Highveld
119·5
Wakkerstroom
Newcastle
'NW' 327·5
'NC' 415
Johannesburg FIR (FAJS) FL195 UIR above
Durban FIR (FADN) Unltd
Vryheid
'VHD' 230
Vryheid
'VHL' 350
Ulundi
'SMH' 457·5
UDEPO
S27 20·0
E032 43·0
Sodwana
'ZQ' 304
Beira FIR (FOBE) FL145
Durban FIR (FADN) Unltd
A333
BEKUG
S28 31·8
E035 00·0
BOTAS
Durnacol
'DH' 357·5
Ladysmith
'LY' 397·5
Durban CTA
FL 460
FL 205
Durban Adv Area
Ulundi
'UL' 422
UL Ch 101(115·4)
'UD' 267·5
Hluhluwe
'HL' 375
R50
Cape Vidal
'ZP' 300
Ornate
'MF' 530
Cape St Lucia
'ZUQ' 313·5
Richards Bay
'RI' 465
Richards Bay
S28 45·6
E032 04·7
AVEKO
S28 43·3
E031 26·9
ALTES
S28 43·8
E031 30·6
Greytown
'GWN' 252·5
'ES' 202·5
Eshowe
S28 53·3
E031 26·9
Muden
'MD' 375
New Hanover
'NH' 225
Kranskop
KA 370
New Hanover
NHV 113·5
Pietermaritzburg (G)
Pietermaritzburg CTR
Nshongweni Mil Helicopter FTA
Virginia (G)
Virginia (A)
Pietermaritzburg TMA
PM 362·5
Pietermaritzburg Flying training area
Durban TMA
DN
DNV
Durban
S29 54·6
E031 00·0
Durban
Ch 72
S29 58·3
E030 57·0
Durban CTR
Durban (ML)
W87
B585
Ifafa Beach
'ZN' 310
Durban CTA
FL460
FL125
Durban App
119·1
UGUNO
S30 38·6
E032 10·1
Port Shepstone
'ZTD' 294·2
'MR' 485
Margate
S30 48·2
E030 22·2
Mzamba
ASPIK
S30 57·7
E030 13·0
St. Johns
S31 38·1
E029 33·0
Durban FIR (FADN) Unltd
Port Elizabeth FIR (FAPE) Unltd
TALVA
S27 57·5
E035 15·5
G451
MUDAP
S28 58·7
E035 00·0
NOPIP
S32 07·7
E035 00·0
'IN' 400
S23 52·0
E035 24·0
Abm Nampula
NAPI
'QL' 267
S17 49·2
E036 52·0
UR525
GADNO
S17 13·0
E041 42·0
MIDRI
S20 28·0
E040 00·0
IMRON
S20 49·6
E037 17·5
EGMAD
S21 55·9
E040 00·0
EROPA
S22 29·7
E040 00·0
Europa
FXE 352
S22 20·0
E040 21·0
BOTAM
S24 30·2
E035 44·4
UB536D
Beira FIR (FOBE) above
Antananarivo FIR (FMMM) FL245 UIR above
UG653D
APLAR
S25 15·2
E035 44·6
SUNIR
S24 12·0
E040 00·0
TALVA
S27 57·5
E035 15·5
UG654D
TETRO
S25 32·0
E040 00·0
TABNO
S10 23·7
E043 38·2
Moroni (Hahaia)
S11 30·7
E043 16·0
VOHID
S10 55·5
E044 19·5
Moroni Radio
4657 5608
8879 11300
HA 316·5
HAI 114·7
FXM
387
Moroni (Iconi)
S11 41·2
E043 14·7
Not UA401
SOLAL
S11 53·1
E041 49·6
UR782F
UB790F
Anjouan
AJ 369
S12 07·7
E044 25·8
DZP
113·5
FJO
341
Dzaoudzi
S12 48·5
E045 16·7
NANDU
S13 22·8
E044 31·0
SOAVI
S13 35·5
E046 12·7
UA401
UR775F
MAROF
S12 18·5
E046 08·0
Grande Glorieuse
FXZ 335
S11 33·0
E047 17·0
Antananarivo
3476 5634
4657
RNAV Route
UG661F
BERIL
ONIVE
ATOLA
MG
112·1
SSJ
Mahajanga
Ch 58
S15 39·4
E046 20·5
Mahajanga CTR
3000
Antananarivo Info
128·9
Juan de Nova
FXJ 337
S17 03·0
E042 45·0
TABNO
S17 39·0
E043 44·0
R30
AMEVA
S16 57·2
E046 42·9
Ankazobe
DIRBA
DOBAR
IDOKO
UA400F
Maintirano
MRO 116·1
MO 376
Antananarivo Ctl
126·7
Antananarivo (Ivato)
Ch 92
SOPVI
Miandrivazo
MZ 310
S19 34·0
E045 27·0
VATOL
S19 41·3
E045 33·6
Soavinandriana
TW 350
UB536F
MDV
114·1
SSV
397
Morondava
S20 16·9
E044 18·9
R28
BOSIT
Fianarantsoa
S21 26·3
E047 06·7
5SF
322
Morombe
MBE 334
S21 45·1
E043 22·2
Antananarivo Info
3476 5634 8879 13306
4657 Domestic
UG652
R26
R25
Toliara
S23 21·5
E043 43·9
TU
116·5
SSQ
367
D19
D14
UG653F
UG654F
Ampanihy
AY 349
S24 42·0
E044 44·0
R27
R35
FDN
D20
D15
Tolagnaro
S25 02·8
E046 56·6
KEDOM
S26 03·9
E043 30·0
UA402F
S26 00·0
E046 00·0
5°W
6°W
7°W
8°W
9°W
10°W
11°W
12°W
13°W
14°W
15°W
16°W
17°W
18°W
19°W
20°W
21°W
22°W
23°W
24°W
25°W
14S
16S
18S
20S
22S
24S
26S
28S
30S
32S
34S
38E
39E
40E
41E
42E
43E
44E
45E
46E
47E
160
180
200
Nautical Miles 50
0
20
40
60
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100
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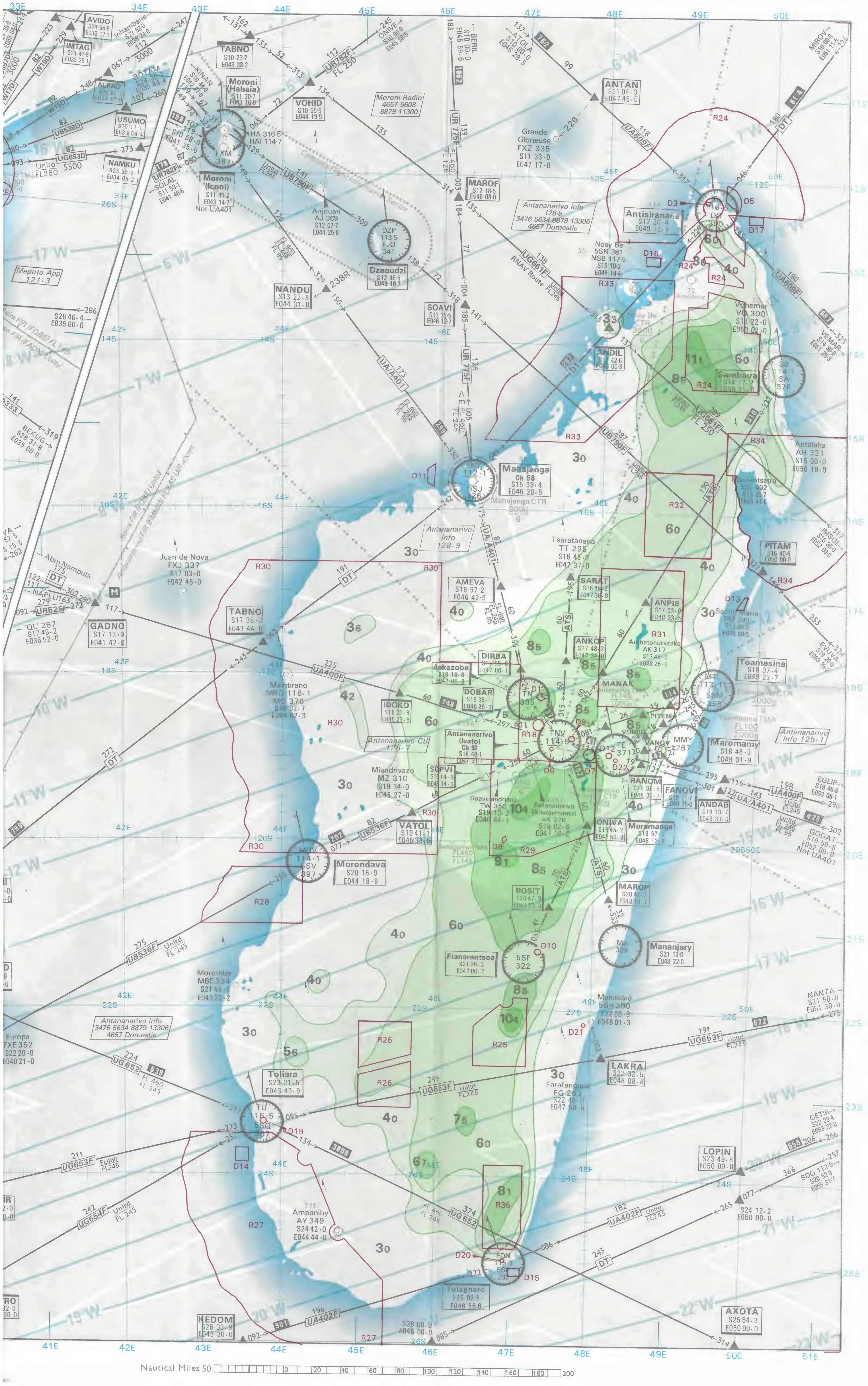
140
160
180


33E
34E
43E
44E
45E
46E
47E
48E
49E
50E
AVIDO
IMTAG
S24 42·8
E033 25·1
Inhambane
ALPAD
BOTAM
USUMO
S25 17·1
E033 58·4
NAMKU
S25 35·2
E034 05·2
UB536D
UG653D
W15D
W19D
Unltd
FL250
5500
TABNO
S10 23·7
E043 38·2
Moroni
(Hahaia)
S11 30·7
E043 16·0
HA 316·5
HAI 114·7
FXM
387
Moroni
(Iconi)
S11 41·2
E043 14·7
Not UA401
UR782F
FL 250
SOLAL
VOHID
S10 55·5
E044 19·5
ONIVE
Moroni Radio
4657 5608
8879 11300
UB790F
Anjouan
AJ 369
S12 07·7
E044 25·8
DZP
113·5
FJO
341
Dzaoudzi
S12 48·5
E045 16·7
NANDU
S13 22·8
E044 31·0
UA/A401
BERIL
UR 775F
FL 460
FL 125
MAROF
S12 18·5
E046 08·0
SOAVI
S13 35·5
E046 12·7
ATOLA
ANTAN
S11 04·3
E047 45·0
Grande
Glorieuse
FXZ 335
S11 33·0
E047 17·0
Antananarivo Info
128·9
3476 5634 8879 13306
4657 Domestic
UG661F
RNAV Route
UA609F
R24
D3
D5
DO
390
Antsiranana
S12 20·4
E049 16·9
D17
D16
Nosy Be
5SN 381
NSB 117·5
S13 18·2
E048 19·4
R33
ANDIL
S13 42·6
E048 00·3
Ambilobe
Vohemar
VO 300
S13 22·0
E050 02·0
Sambava
S14 17·2
E050 15·8
SB
114·1
SA
376
MIROV
VEMAR
R34
Antalaha
AH 321
S15 00·0
E050 19·0
Maputo App
121·3
S26 46·4
E035 00·0
Beira FIR (FQBE) FL 145
BEKUG
S28 31·8
E035 00·0
MGT
112·1
5SJ
326
Mahajanga
Ch 58
S15 39·4
E046 20·5
Mahajanga CTR
3000
D11
Antananarivo
Info
128·9
R32
Maroantsetra
IMSOL
PITAM
S16 40·6
E050 00·0
Tsaratanana
TT 295
S16 45·0
E047 37·0
Juan de Nova
FXJ 337
S17 03·0
E042 45·0
Nampula
NAPLU
UR525
'QL' 267
S17 49·2
E036 52·0
GADNO
S17 13·0
E041 42·0
R30
TABNO
S17 39·0
E043 44·0
AMEVA
S16 57·2
E046 42·9
SARAT
ANPIS
S17 03·0
E048 33·5
R31
Ambatondrazaka
AK 317
S17 48·0
E048 26·0
D13
Sainte Marie
SM 290
R34
EVUVA
Toamasina
S18 07·4
E049 23·7
MT
113·1
5SM
358
Toamasina CTR
Toamasina TMA
FL 100
2000
Antananarivo
Info 125·1
UA400F
Maintirano
MRO 116·1
MO 376
S18 02·7
E044 02·3
Ankazobe
S18 18·8
E047 06·9
DIRBA
ANKOP
MANAK
Antananarivo TMA
IDOKO
S18 21·8
E045 27·6
DOBAR
S18 35·1
E046 29·3
TN
385
D1
Antananarivo
(Ivato)
Ch 92
S18 48·1
E047 31·1
Antananarivo Ctl
126·7
R18
TNV
114·5
D6
D7
D9
D12
TE
371
D22
VOMID
PITEM
VANOV
MMY
267
Maromamy
S18 48·3
E049 01·9
EGLIP
GODAT
Not UA401
UA/A401
ANDAB
S19 19·7
E049 33·6
FANOV
S19 11·7
E049 35·6
RANOM
S19 02·5
E048 32·7
SOPVI
Miandrivazo
MZ 310
S19 34·0
E045 27·0
Soavinandriana
TW 350
S19 10·3
E046 44·1
Antananarivo
(Arivonimamo)
AR 376
S19 02·0
E047 10·0
ONIVA
S19 45·2
E047 50·8
Moramanga
S18 57·0
E048 13·6
VATOL
S19 41·3
E045 38·6
UB536F
MDV
114·1
5SV
397
Morondava
S20 16·9
E044 18·9
D8
R29
BOSIT
MAROP
MJ
329
Mananjary
S21 12·0
E048 22·0
R28
UB536F
Morombe
MBF 334
S21 45·1
E043 22·2
5SF
322
Fianarantsoa
S21 26·3
E047 06·7
D10
NANTA
S21 50·0
E051 30·0
Antananarivo Info
3476 5634 8879 13306
4657 Domestic
Europa
FXE 352
S22 20·0
E040 21·0
UG652
R26
R25
D21
Manakara
5SR 390
S22 06·9
E048 01·3
UG653F
LAKRA
S22 32·5
E048 08·8
Toliara
S23 21·5
E043 43·9
Farafangana
FG 263
S22 48·0
E047 50·0
TU
116·5
5SQ
367
D19
D14
UG653F
R27
UG654F
Ampanihy
AY 349
S24 42·0
E044 44·0
R35
LOPIN
S23 49·8
E050 00·0
GETIR
SDG 112·5
S24 12·2
E050 00·0
UA402F
FDN
D20
D15
Tolagnaro
S25 02·8
E046 56·6
KEDOM
S26 03·9
E043 30·0
UA402F
S26 00·0
E046 00·0
AXOTA
S25 54·3
E050 00·0
41E
42E
43E
44E
45E
46E
47E
48E
49E
50E
51E
Nautical Miles 50 0 20 40 60 80 100 120 140 160 180 200

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DEPARTMENT OF POSTS AND TELECOMMUNICATIONS
REPUBLIC OF SOUTH AFRICA

DEPARTEMENT VAN POS- EN TELEKOMMUNIKASIEWESE
REPUBLIEK VAN SUID-AFRIKA

APPLICATION FOR PRIVATE RADIOCOMMUNICATION LICENCE
AANSOEK OM PRIVAAT RADIOKOMMUNIKASIELISENSIE

(To be completed in duplicate/Moet in tweevoud ingevul word)

NO PAYMENT TO ACCOMPANY THIS APPLICATION FORM.
GEEN BETALING MOET HIERDIE AANSOEKVORM VERGESEL NIE.

For office use/Vir kantoorgebruik	
File no./Lêerno.	CE no./HI-no.

1. Name and postal address of applicant
Naam en posadres van aansoeker ....

PO Box Posbus .... City Stad .... Postcode Poskode........ Telephone no. (See note 1) Telefoon no. (Sien opmerking 1) ....

2. Description of business/Beskrywing van besigheid

3. Purpose of communication/Doel van kommunikasie

4. Frequency requirements
Frekwensievereistes....................

5. System requirements (Mark with a cross in appropriate square)/Stelselvereistes (Merk met 'n kruis in toepaslike blokkie)

Single frequency Enkelfrekwensie		Control via relay to mobile Beheer via herleier na mobiel		Base & mobile only Slegs basis & mobiel		Telemetering Telemeting	
Double frequency Dubbelfrekwensie		Base via repeater to mobile Basis via herhaler na mobiel		Repeater & mobile only Slegs herhaler & mobiel		Radio link Radioskakel	
Radio alarm and control Radioalarm en beheer		Very-short-range communication only Slegs baiekortafstand-kommunikasie		Mobile units only Slegs mobiele eenhede		Land lines Landlyne	

6. FM Deviation FM-deviasie ± ....kHz

Channel spacing Kanaalspasiëring ....kHz

7. AM Emission AM-emissie ....

Bandwidth Bandbreedte ....kHz

8. System description/Stelselbeskrywing	Transmitter power Senderdrywing Watt	Antenna type and gain Antennetipe en wins	Equipment make and type Fabrikaat en tipe toerusting	Number of units Getal eenhede	Address/Exact location of each station Adres/Presiese ligging van elke stasie (See note 5) (Sien opmerking 5)
Base: Control Basis: Beheer					
Relay/Repeater Herleier/Herhaler					
Radio link Radioskakel					
Vehicle-mounted Voertuiggemonteer					9. Required area of operation (See note 6) Verlangde werksgebied (Sien opmerking 6)
Carried on person Aan persoon gedra					
Alarm outstation Alarm buitestasie					
Paging receivers Naamroepontvangers					

10. SIGNATURE HANDTEKENING .... CAPACITY HOEDANIGHEID .... DATE DATUM ....

FOR OFFICE USE ONLY — SLEGS VIR KANTOORGEBRUIK

Station type Tipe stasie	Base Basis	Link/Skakel Control and relay Beheer en herleier	Relay/Herleier Repeater/Herhaler	Mobile/Mobiel Outstation/Buitestasie	Bandwidth and emission Bandbreedte en emissie
Frequencies Frekwensies ....MHz					
Maximum power Maksimum drywing.........W					
Antenna type and gain Antennatipe en -wins ......dB					Area of operation Werksgebied
Frequency tolerance Frekwensietoleransie ...± kHz					
Deviation Deviasie ....± kHz					
Channel spacing Kanaalspasiëring ....kHz					

Cat Kat .... Tel no. Telno. .... Date Datum..................

Eng. no. Ing.no. .... Date Datum .... Chief Engineer/Hoofingenieur

P.T. 680—1979-80

T 122

NOTES

1. If there is a switchboard the main number must be quoted.

Should you not be a telephone subscriber or if the telephone is not rented in your name, you must endorse the application form *NIL*.

2. A base station (where applicable) must normally be established on the applicant's premises. Should it be necessary for technical or other reasons to erect the base station elsewhere, prior application for telephone leads to connect the base station with the applicant's premises must be made to the local postmaster or Regional Director (Telephone Services). An application for a radio link will only be considered if it is accompanied by a letter from the postmaster or Regional Director (Telephone Services) confirming that no telephone leads are available or can be made available within a reasonable period.

3. It is essential that both the make and type of equipment be clearly specified, e.g. make: Phyerole; type: ACA, VP 91.

4. The frequency band for which the equipment is designed is required against item 4.

5. For *all* systems the geographical co-ordinates for each fixed station must be furnished in degrees and minutes, East and South. Should the co-ordinates not be available, an official map of the area on which the location of each fixed station is clearly indicated in ink must be made available.

6. The required area of communication must so far as possible be expressed in a kilometre radius from the fixed/base station or any other fixed point.

7. Each application must be accompanied by two copies of form T 123 duly completed on the reverse side.

8. Address all correspondence to:

The Senior Director
Telecommunications: Commercial
(Radio Branch)
Private Bag X74
PRETORIA
0001

OPMERKINGS

1. Indien daar 'n skakelbord is, moet die hoofnommer vermeld word.

As u nie 'n telefoonhuurder is nie of die telefoon word nie in u naam gehuur nie, moet u die aansoekvorm *NUL* endosseer.

2. 'n Basisstasie (as dit van toepassing is) moet normaalweg op die aansoeker se perseel opgerig word. Indien dit om tegniese of ander redes nodig is om die basisstasie elders op te rig, moet daar vooraf by die plaaslike posmeester of Streekdirekteur (Telefoondienste) aansoek gedoen word om telefoonleidings om die basisstasie met die aansoeker se perseel te verbind. 'n Aansoek om 'n radioskakel sal slegs oorweeg word indien dit vergesel gaan van 'n brief van die posmeester of Streekdirekteur (Telefoondienste) wat bevestig dat geen telefoonleidings beskikbaar is of binne 'n redelike tydperk beskikbaar gestel kan word nie.

3. Dit is noodsaaklik dat sowel die fabrikaat as die tipe toerusting duidelik vermeld word, bv. fabrikaat: Phyerole; tipe: ACA, VP 91.

4. Die frekwensieband waarvoor die toerusting ontwerp is, word teenoor item 4 verlang.

5. Vir *alle* stelsels moet die geografiese koördinate van elke vaste stasie in grade en minute, Oos en Suid, verstrek word. As die koördinate nie beskikbaar is nie, moet 'n amptelike kaart van die gebied waarop die ligging van elke vaste stasie duidelik in ink aangedui is beskikbaar gestel word.

6. Die verlangde kommunikasiegebied moet sover moontlik in 'n kilometerradius van die vaste of basisstasie of enige ander vaste punt uitgedruk word.

7. Elke aansoek moet vergesel wees van twee kopieë van vorm T 123 wat behoorlik op die keersy ingevul is.

8. Rig alle korrespondensie aan:

Die Senior Direkteur
Telekommunikasie: Kommersieel
(Radiotak)
Privaatsak X74
PRETORIA
0001

747- 9111.   Baroni

P.T. 727-1973/74— 26 000

T 123(a)

CONDITIONS OF ISSUE OF PRIVATE RADIOCOMMUNICATION LICENCES

1. Licences shall be temporary and may be withdrawn when adequate public telecommunication facilities become available.
2. Communication between fixed stations is prohibited.
3. Extension to the public telephone system is prohibited.
4. The licensed station shall be operated only by reliable persons appointed by the licensee.
5. The licensee shall not divulge to any person (other than properly authorized officials of the Government or a competent judiciary tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus.
6. Each station shall transmit its officially allocated call sign at least once during the course of transmissions. The call sign should be displayed on or near the radio set.
7. If the licensee is at any time required to make technical or other modifications to his radio communication system, he shall arrange for such modifications to be done without claim for compensation for any financial or other loss sustained as a result of such modifications.
8. Radio apparatus shall not be acquired for the establishment of a radiocommunication service or for the extension of an existing radiocommunication service unless the Postmaster General has indicated in writing that he is prepared to authorize the establishment or extension of such services and to issue the appropriate licences.
9. Radio apparatus authorized for installation at a fixed point shall not be transferred to any other point without the approval of the Postmaster General. Licences are not transferable.
10. Only radio apparatus that conforms to Post Office requirements shall be used for a licensed radiocommunication service.
11. The radio apparatus shall be used solely for the purposes stated in the application for a licence and shall not be used if normal telephone facilities can be used. Transmission of music or entertainment of any kind or anything of a blasphemous, indecent, obscene, offensive or libellous nature is forbidden. Transactions should be as brief as possible and be confined to essential communications.
12. The licensee shall undertake to maintain the radio apparatus in good technical order (in particular the fixed and/or repeater stations) to ensure that it complies with SAPO technical requirements at all times and that it does not cause interference to other radio users.
13. The apparatus at the licensed station shall be subject to inspection by the Postmaster General or his authorized representative at all reasonable times.
14. A licence is valid only for the specific area as prescribed on the licence.
15. Licences shall expire on 31 December of the year during which the licences are issued but may be renewed at the discretion of the Postmaster General for further periods of not more than one year each.

SPECIAL CONDITIONS REGARDING LICENCES FOR VHF AND HF STATIONS

16. The assigned channel may be shared by other users and the provision of privacy facilities is optional. Mutual arrangements with the joint users shall be made in order to accomplish satisfactory utilization of the facility.
17. Spurious radiations, including harmonic emissions and intermodulation products, shall conform to the following requirements:
    (a) Below 30 MHz: 40 dB below the mean power of the fundamental frequency without exceeding 50 mW.
        (i) For portable radio equipment with a power of less than 5 W the attenuation should be at least 30 dB.
        (ii) For mobile transmitters any spurious radiation shall be at least 40 dB below the fundamental frequency without exceeding the value of 200 mW.
    (b) 30 MHz to 235 MHz: For transmitters having mean power of —
        (i) More than 25 W — 60 dB below the mean power of the fundamental frequency without exceeding 1 mW;
        (ii) 25 W or less — 40 dB below the mean power of the fundamental frequency without exceeding 25 μW and without the necessity for reducing this value below 10 μW.
        (iii) For frequency-modulated maritime mobile radio telephone equipment the mean power of any spurious radiation falling in any other international maritime mobile channel owing to products of modulation shall not exceed a limit of 10 μW and the mean power of any other spurious radiation at any discrete frequency within the international maritime mobile band shall not exceed a limit of 2,5 μW. Where transmitters of mean power above 20 W are employed, these limits may be increased in proportion to the mean power of the transmitter.
18. The licence fee for each two-way station shall be R10 a year or portion thereof and R4 a year or portion thereof for each one-way paging receiver. **This fee will be collected by the postmaster in due course.**

T 123(a)

SPECIAL CONDITIONS PERTAINING TO STATIONS OPERATING IN THE VERY SHORT RANGE BAND

19. Frequency tolerance: 200 parts in 10^6
20. Bandwidth: 6 kHz
21. Final stage DC input power: 100 mW
22. Maximum transmitter antenna length shall be 1,5 m
23. Spurious radiation, including harmonic emissions and intermodulation products, shall not exceed 50 μW.
24. Frequencies within the frequency band 26,96 to 27,28 MHz are primarily designated for industrial, scientific and medical purposes. Users of radiocommunication services operating within the limits of these frequencies shall accept unconditionally any harmful interference as a result of the operation of industrial, scientific and medical equipment.
25. The assigned frequency may be shared by other licensees for communication purposes. No complaints regarding interference shall be entertained by the Post Office.
26. The licence fee for each station shall be R5 a year or portion thereof. *This fee will be collected by the postmaster in due course.*

AGREEMENT BY APPLICANT

The issue of private radiocommunication licences is subject to the provisions of the Radio Act (Act 3 of 1952), as amended, and such conditions as may be prescribed by the Postmaster General.

I/We accept licences on these conditions.

Signed by the applicant in his capacity of

....

at ....

this .... day of .... 19.......

SIGNATURE: ....

NOTES:

1. This form should be completed in duplicate. One copy will be returned with the licence if the application is successful. Each radio operator should fully acquaint himself with the conditions stipulated on this form.
2. Address all correspondence to:

THE DIRECTOR
TELECOMMUNICATION OPERATING
(RADIO BRANCH)
PRIVATE BAG X74
PRETORIA
0001

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